DOCUMENT RESUME

ED 290 709 SP 029 797

AUTHOR	Franks, B. Don, Ed.
TITLE	Abstracts of Research Papers Presented at the National Convention of the American Alliance for Health, Physical Education, Recreation and Dance (Cincinnati, Ohio, April 10-13, 1986).
INSTITUTION	American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD).
REPORT NO	ISBN-0-88314-328-3
PUB DATE	86
NOTE	253p.
AVAILABLE FROM	American Alliance for Health, Physical Education, Recreation and Dance Publication, P.O. Box 704, Waldorf, MD 20601 ($7.15).
PUB TYPE	Collected Works - Conference Proceedings (021)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Abstracts; *Educational Research; *Health; *Physical Education; Physical Fitness

ABSTRACT

This volume contains the Research Consortium abstracts accepted for the 1986 American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) convention in Cincinnati, Ohio. There are 45 papers and 184 poster papers that were selected for presentation from a total of 376 abstracts submitted. Each abstract was evaluated by three qualified reviewers in the appropriate area. In addition, 12 Symposia were accepted for presentation following a similar review process. The symposia, free communication, and poster abstracts are presented in chronological order within each category. Date and time of presentation are listed in the lower left hand corner of each abstract; the author's contact address is included. (JD)

****
*   Reproductions supplied by EDRS are the best that can be made   *
*   from the original document.   *
****

ED290709

BEST COPY AVAILABLE

ABSTRACTS

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

● Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

G. Anderson

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

SP 029 797

ABSTRACTS

of Research Papers 1986

B. Don Franks, Editor
University of Tennessee, Knoxville

Presented at the Cincinnati, Ohio Convention of
American Alliance for Health,
Physical Education, Recreation and Dance
in the Research Consortium Meetings

Copyright © 1986
American Alliance for
Health, Physical Education,
Recreation, and Dance
1900 Association Drive
Reston, Virginia 22091
ISBN 0-88314-328-3

Purposes of the American Alliance For Health, Physical Education, Recreation and Dance

The American Alliance is an educational organization, structured for the purposes of supporting, encouraging, and providing assistance to member groups and their personnel throughout the nation as they seek to initiate, develop, and conduct programs in health, leisure, and movement-related activities for the enrichment of human life.

Alliance objectives include:

1. Professional growth and development – to support, encourage, and provide guidance in the development and conduct of programs in health, leisure, and movement-related activities which are based on the needs, interests, and inherent capacities of the individual in today's society.
2. Communication – to facilitate public and professional understanding and appreciation of the importance and value of health, leisure, and movement-related activities as they contribute toward human well-being.
3. Research – to encourage and facilitate research which will enrich the depth and scope of health, leisure, and movement-related activities; and to disseminate the findings to the profession and other interested and concerned publics.
4. Standards and guidelines – to further the continuous development and evaluation of standards within the profession for personnel and programs in health, leisure, and movement-related activities.
5. Public affairs – to coordinate and administer a planned program of professional, public, and governmental relations that will improve education in areas of health, leisure, and movement-related activities.
6. To conduct such other activities as shall be approved by the Board of Governors and the Alliance Assembly, provided that the Alliance shall not engage in any activity which would be inconsistent with the status of an educational and charitable organization as defined in Section 501(c) (3) of the Internal Revenue Code of 1954 or any successor provision thereto, and none of the said purposes shall at any time be deemed or construed to be purposes other than the public benefit purposes and objectives consistent with such educational and charitable status.

Bylaws, Article III

PREFACE

This volume contains the Research Consortium abstracts accepted for the 1986 AAHPERD Convention in Cincinnati. There are 45 free papers and 184 poster papers that were selected for presentation from a total of 376 abstracts submitted. Each abstract was evaluated by three qualified reviewers in the appropriate area, as recommended by AAHE, AALR, NAGWS, NDA, Councils of ARAPCS, and NASPE Academies. Almost 100 scholars volunteered their time to assist with the review process--their names and institutions are listed on the following pages. In addition, 12 Symposia were accepted for presentation following a similar review process coordinated by Dr. Russell Pate, Secretary of the Research Consortium. In cooperation with AAHE, AALR, and NASPE, the Consortium has invited recognized scholars to present research at four Special Sessions. Check your Convention Program for the date and time of the Special Sessions, and for room assignments for all the sessions.

The symposia, free communication, and poster abstracts are presented in chronological order within each category. Date and time of presentation are listed in the lower left-hand corner of each page. Contact the author, listed in the lower right-hand corner for further information on a specific research paper.

The Consortium would like to thank the authors and coauthors who submitted abstracts, and are presenting symposia, free papers, and poster papers. Thanks should also go to Marlene Adrian, Dean Anderson, Rayma Beal, Linda Bunker, Jane Clark, Dave Cundiff, Pat Dodds, John Dunn, Gladys Garrett, Gene Hayes, Dan Landers, Jim Morrow, Brian Sharkey, and Bob Sparks, who recommended reviewers. Thanks to Pricilla Clarkson and Tom O'Rourke for extra help with the NAGWS and Health and Safety, respectively. Thanks to Russ Pate for his third year of handling the symposia and to Emily Haymes for many helpful suggestions; and thanks to Ray Ciszek, Gladys Merrick, and many others at AAHPERD Headquarters for their assistance. Finally, thanks to Martha Davis who assisted with many tasks, and a special thanks to Carol Phillips who typed, sorted, and handled many of the details of the process.

It will have been worth the many hours and the collective effort if these presentations add to the body of knowledge, stimulate discussion of concepts, provide new ideas for research, assist in improvements in research design and methodology, and expand interest in research in HPERD professionals.

B. Don Franks
President-Elect, Research Consortium
Center for Physical Activity and Health
Division of Physical Education
University of Tennessee
Knoxville, Tennessee 37996

REVIEWERS

The following fellows and members of the Research Consortium served as reviewers for the symposia:

Berger, Bonnie	Brooklyn College
Boileau, Richard	University of Illinois, Urbana
Dunn, Diana	Pennsylvania State University, University Park
McKeown, Barry	University of Texas, Arlington
Young, Michael	University of Arkansas, Fayetteville

The following fellows and members of the Research Consortium served as reviewers for the abstracts submitted for the 1986 AAHPERD Convention:

Allegrante, John	Columbia University
Alles, Wesley	Pennsylvania State University, University Park
Allison, Pam	Bowling Green State University, Ohio
Anderson, Dean	Iowa State University, Ames
Austin, David	Indiana University, Bloomington
Auxter, Dave	Slippery Rock State College
Bain, Linda	University of Houston
Beal, Rayma	Miami University, Oxford, Ohio
Beitel, Patricia	University of Tennessee, Knoxville
Belka, David	Miami University, Oxford, Ohio
Berger, Bonnie	Brooklyn College
Broadhead, Geoff	Louisiana State University, Baton Rouge
Bibeau, Daniel	University of North Carolina, Greensboro
Bunker, Linda	University of Virginia, Charlottesville
Campbell, Kevin	University of Massachusetts, Amherst
Clark, Jane	University of Maryland, College Park
Clarkson, Priscilla	University of Massachusetts, Amherst
Creswell, William, Jr.	University of Illinois, Champaign
Croskey, Richard	University of Tennessee, Knoxville
DeSensi, Joy	University of Tennessee
Disch, James	Rice University, Houston
Dodds, Patt	University of Massachusetts, Amherst
Drinkwater, Barbara	Pacific Medical Center, Seattle
Drolet, Judy	Southern Illinois University, Carbondale
Dummer, Gail	Michigan State University, East Lansing
Eddy, James	Pennsylvania State University, University Park
Eisenman, Pat	University of Utah, Salt Lake City
Emery, Lynne	California Polytech State University, San Luis Obispo
Erbaugh, Sarah	Wayne State University, Detroit
Feltz, Deborah	Michigan State University, East Lansing
Galli, Nicholas	Lehman College, New York

Gold, Robert	Office of Disease Prevention and Health Promotion, Washington, D.C.
Goldberger, Michael	Temple University, Philadelphia
Governali, Joe	SUNY, Cortland
Greenberg, Jerrold	University of Maryland, College Park
Greendorfer, Susan	University of Illinois, Urbana
Harris, Dorothy	Pennsylvania State University, University Park
Harris, Janet	University of North Carolina, Greensboro
Hayes, Gene	University of Tennessee, Knoxville
Henschen, Keith	University of Utah, Salt Lake City
Hensley, Larry	University of Northern Iowa, Cedar Falls
Higginson, David	Creighton University, Omaha
Howley, Edward	University of Tennessee, Knoxville
Husak, William	California State University, Long Beach
Kearney, Jay	University of Kentucky
Kelley, Dennis	University of Tennessee, Knoxville
Knowles, Claudia	Texas Educational Agency, Austin
Landers, Daniel	Arizona State University, Tempe
LaPointe, Jan	Texas Women's University
Lawrence, Lynette	University of North Carolina, Greensboro
Lay, Nancy	University of Tennessee, Knoxville
Liemohn, Wendell	University of Tennessee, Knoxville
Lundegren, Herberta	Pennsylvania State University, University Park
Morgan, William	University of Tennessee, Knoxville
Morrow, James	University of Houston
Nelson, Jack	Louisiana State University, Baton Rouge
Noble, Larry	Kansas State University, Manhattan
Olson, Janice	Purdue University, West Lafayette, Indiana
O'Rourke, Thomas	University of Illinois, Urbana
Overby, Lynnette	Howard University
Owen, Marjorie	Temple University, Philadelphia
Park, Roberta	University of California, Berkeley
Perry, Jean	San Francisco State University
Pigg, R. Morgan, Jr.	Indiana University, Bloomington
Placek, Judy	Boston University
Remley, Mary Lou	Indiana University, Bloomington
Rikli, Roberta	California State University, Fullerton
Roberton, Mary Ann	University of Wisconsin, Madison
Rotella, Robert	University of Virginia, Charlottesville

Rothstein, Anne	City University of New York
Rubinson, Laurna	University of Illinois, Champaign
Sady, Stanley	University of Nebraska, Omaha
Schempp, Paul	University of Oregon, Eugene
Schwarzhopf, Robert	Montana State University, Bozeman
Serfass, Robert	University of Minnesota, Minneapolis
Sharkey, Brian	University of Montana
Silverman, Stephen	University of Texas, Austin
Slaughter, Mary	University of Illinois, Knoxville
Sparks, Robert	University of British Columbia, Vancouver
Surburg, Paul	Indiana University, Bloomington
Svoboda, Milan	Portland State University
Thirer, Joel	Illinois State University, Normal
Valois, Robert	University of Alabama, Birmingham
Vander Velden, Lee	University of Maryland, College Park
Van Handel, Peter	Olympic Sports Center, Colorado Springs
Vitello, Elaine	Southern Illinois University, Carbondale
Wade, Michael	University of Southern Illinois, Carbondale
Wallace, Bill	University of Tennessee, Knoxville
Watson, Scott	Ithaca College, New York
Wrisberg, Craig	University of Tennessee, Knoxville
Yerg, Beverly	Florida State University, Tallahassee
Yianakis, Andrew	University of Connecticut, Storrs
Young, Michael	University of Arkansas, Fayetteville
Zebas, Carole	University of Kansas, Lawrence

SPECIAL SESSIONS

Thursday, 10:45
Research Consortium and NASPE, "Timing and Coordination of Interlimb Movements."
Presider: Pat Del Rey
Speaker: Antoinette M. Gentile, Teachers College, Columbia University
Reactors: Gilmour Reeve, Auburn University; Charles Shea, Texas A & M University

Thursday, 2:00
Research Consortium and AAHE, "Health Promotion at the Workplace: Does It Make a Difference?"
Presider: Diane Spitler, University of North Carolina, Greensboro
Speaker: Steven N. Blair, Institute for Aerobic Research, Dallas
Reactors: Dennis Colacina, Pepsico Inc.; Donald I. Wagner, University of Cincinnati

Friday, 9:00
AAHPERD Alliance Scholar
George Sage

Friday, 10:45
Research Consortium Business Meeting
Presider: Emily Haymes, President, Florida State University
Recorder: Russell Pate, Secretary, University of South Carolina, Columbia

Friday, 2:00
Research Consortium and AALR, "Securing External Funds: A Changing Enterprise."
Presider: Marcia Carter, Department of Parks and Recreation, Dallas
Speaker: E. R. Buskirk, Pennsylvania State University
Reactors: Gary Ellis, University of Utah; George Stelmach, University of Wisconsin, Madison

Saturday, 9:00
"The Incipient Researchist: Don't Start Vast Projects with Half-Vast Ideas."
Presider: Emily Haymes, Florida State University
Speaker: Jerry R. Thomas, Louisiana State University
Reactors: Harold B. Falls, Southwest Missouri State University, Margaret J. Safrit, University of Wisconsin, Madison

Sunday, 7:30
McCloy Breakfast and Research Lecture
Speaker: *E. R. Buskirk*, Pennsylvania State University

Thursday, 10:45
Midwest Scholar Lecture, "Public School Physical Education:
Six Obstacles We Must Overcome."
Vern Seefeldt

TABLE OF CONTENTS

Preface v

Reviewers vii

Special Sessions xi

SYMPOSIA

Research Consortium Symposium, "Validity Generalization Model: An Analysis of Validity Studies." Margaret J. Safrit, Moderator. 1

Research Consortium and NDA Symposium, "Dance, in the 1920's and 1930's." L. Lynne Emery, Moderator. 2

Research Consortium and NDA Symposium, "Dance Activities and Successful Adaptation in Older Adults." Rayma K. Beal, Moderator. 3

Research Consortium Symposium, "Teacher Socialization in Physical Education." David E. Belka, Moderator. 4

Research Consortium Symposium, "Coincidence-Anticipation Timing: Research and Research Process." V. Gregory Payne, Moderator. 5

Research Consortium Symposium, "Role of Exercise in Diabetes Mellitus." Kris E. Berg, Moderator. 6

Research Consortium Symposium, "Reexamination of Flexibility Implication for Rehabilitation and Exercise Prescription." Paul Surburg, Moderator. 7

Research Consortium and NDA Symposium, "Application of Laban's Movement Prescription to Curriculum and Instruction in Physical Education." Linda Lander and Pamela Allison, Moderators. 8

Research Consortium Symposium, "Physical Fitness Assessment and Programming for Moderately and Severely Mentally Retarded Adults." Garth Tymeson and Bo Fernhall, Moderators. 9

Research Consortium and NAGWS Symposium, "A Decade of Research Pertinent to Girls' and Women's Sports." Lois A. Klatt, Moderator. 10

Research Consortium Symposium, "Obesity: Health Implications." Joseph E. Donnelly, Moderator. 11

Research Consortium and AALR Symposium, "Leisure and Wellness." Hilmi M. Ibrahim, Moderator. 12

FREE PAPERS

Biomechanics. Presider: Larry Noble, Kansas State University 13

Recreation. Presider: Hilmi Ibrahim, Whittier College 18

Health. Presider: James Eddy, Pennsylvania State University, University Park 23

Measurement and Evaluation. Presider: Sharon Guant, University of Georgia, Athens 28

Pedagogy. Presider: Beverly Yerg, Florida State University 33

Body Composition in Girls' and Women's Sports. Presider: Patty Freedson, University of Massachusetts, Amherst 38

Psychology. Presider: Deborah Feltz, Michigan State University, East Lansing 43

Psychobiology. Presider: Brad Hatfield, University of Maryland 49

Activities for Special Populations. Presider: Walter Davis, Kent State University 53

POSTERS

Health and Safety. Presider: Robert Valois, University of Alabama, Birmingham 58

Biomechanics. Presider: Carole Zebas, University of Kansas 84

NAGWS, Recreation and Sociology. Presider: Nancy Lay, University of Tennessee, Knoxville 95

Administration, Curriculum, Growth and Development, and Dance. Presider: Jane Clark, University of Maryland 110

Pedogogy. Presider: Patt Dodds, University of Massachusetts, Amherst 127

Motor Control and Motor Learning. Presider: Patricia Beitel, University of Tennessee, Knoxville 150

Psychology and Sport Psychology. Presider: Evelyn Hall, Louisiana State University 168

Physiology. Presider: Robert Moffatt, Florida State University 194

Activities for Special Populations. Presider: Dale Ulrich, Indiana University, Bloomington 211

Measurement and Evaluation, Body Composition, and Health-related Fitness. Presider: Jim Disch, Rice University 224

THE VALIDITY GENERALIZATION MODEL: AN ANALYSIS OF VALIDITY STUDIES. **Margaret J. Safrit, Glaucia M. Costa, Linda M. Hooper, University of Wisconsin, Madison, Patricia Patterson, San Diego State University, Robert W. Schutz, University of British Columbia, Vancouver**

This symposium is designed to present an overview of the validity generalization model, which was developed as a means of enhancing the theoretical base of validity studies. Because the model is a type of meta-analysis, the similarities and differences in the two approaches will be described in the first presentation. In the second presentation, the validity generalization model will be the primary focus, including an eight-step approach to conducting a validity generalization study. In the third presentation, an example using a small data set from physical education research will be presented. A discussant will react to the model as well as the three presentations in the final session. Generally, the topic of this symposium should appeal to scholars in physical education and exercise science who are interested in test validity specifically and the measurement of motor behavior in general.

Margaret J. Safrit
Dept. of Physical Education
University of Wisconsin-Maidson
Madison, WI 53706

Thursday, April 10
9:00-10:15 a.m.

DANCE IN THE 1920's AND 1930's: AESTHETIC, ECONOMIC AND SOCIAL INFLUENCES. L. Lynne Emery, California State Polytechnic University, Dianne S. Howe, Carmichael, California, Sarah Chapman, Temple University, Mark Wheeler, University of Georgia, Deborah Welsh, Syracuse University

The purpose of this symposium is to explore the aesthetic, economic and social influences on dance in the 1920's and 1930's in both Europe and the United States. The impact of the German expressionist aesthetic on the philosophy and choreography of Mary Wigman will be discussed as will the influence on European and American dance of Rudolf Laban's Movement Choirs. America's social, economic and political climate in the 1930's will be studied in an attempt to determine its affect on dance and Martha Graham's symbolic opposition to the Great Depression will be examined througt study of three of her choreographic works.

This symposium is targeted for NDA members plus possible interest by those in the Sport Art and Sport Sociology Academies.

L. Lynne Emery
Dept. of HPERD
California State Polytechnic Unv.
Pomona, CA 91768

Thursday, April 10
10:45-12:00 p.m.

DANCE ACTIVITIES AND SUCCESSFUL ADAPTATION IN OLDER ADULTS.

Rayma K. Beal, Oxford Senior Citizens and Community Center, Graham Hempel, San Diego State University, Sherrill Berryman-Miller, Howard University, Josie Metal-Corbin, Roger E. Foltz, University of Nebraska

The purpose of the symposium is to examine a variety of dance activities used with populations of older adults. It has been demonstrated that exercise programs with older adults improve their physiological and psychological functioning. The use of dance activities may meet exercise needs and provide increased psychological satisfaction. Several measures of aging successfully, along with demographic data on older folk dancers, and sections of an interdisciplinary intergenerational videotaped dance will be presented. The target audience consists of members of the National Dance Association, American Association for Leisure and Recreation, Therapeutic Council, and the Committee on Aging.

Rayma K. Beal
Oxford Senior Citizen & Community
Center
Oxford, Ohio 45056

Thursday, April 10
2:00-3:15 p.m.

TEACHER SOCIALIZATION IN PHYSICAL EDUCATION.

David E. Belka, Miami University, Alison Dewar, University of British Columbia, T. Templin, Purdue University, Judith H. Placek, Boston University

Research on teacher socialization has provided an enhanced understanding of why recruits choose physical education as a career, possible reasons why they resist content in teacher education. Although there is an increasing understanding of teacher socialization, informed discussions of the implications of this research for the design and conduct of teacher education programs have not been provided in TEPE. In fact, there have been few published attempts to link teacher education with research on teacher education. It is time to address this oversight.

The symposium focuses on a synthesis of the teacher socialization literature built about four current research projects. Although their abstracts summarize the current research focus and past, related work, the speakers will present strategies for improving TEPE. The final speaker will frame major research and curriculum needs in teacher education programs. The last part of the symposium will involve the audience in questions and reactions to the program ideas presented by the speakers.

David E. Belka
Dept. of HPR, Phillips Hall
Miami University
Oxford, Ohio 45056

Friday, April 11
2:00-3:15 p.m.

COINCIDENCE-ANTICIPATION TIMING: THE RESEARCH AND THE RESEARCH PROCESS.

V. Gregory Payne, San Jose State University, Craig A. Wrisberg, University of Tennessee, Knoxville, L.R.T. Williams, University of Otago, Stan Bassin, California State Polytechnic University, Kathleen Haywood, University of Missouri

Considerable research has been conducted in the area of coincidence-anticipation Timing (CAT). The purpose of this proposed symposium is to analyze and synthesize the research completed in this area and the research process by:

1. defining CAT.
2. examining the purpose of CAT research.
3. discussing methods commonly employed in CAT research.
4. discussing common problems in CAT research.
5. reviewing significant CAT research.
6. examining specific developmental implications derived from CAT research.
7. discussing potential practical applications of CAT research.
8. examining the future direction of CAT research.

The symposium is designed, therefore, to enable an educational interaction for the researcher, practitioner, and student. A forum will be created for the dissemination and discussion of major issues related to research on CAT.

V. Gregory Payne
Dept. of Physical Education
San Jose State University
San Jose, California 95124

Friday, April 11
3:45-5:00 p.m.

THE ROLE OF EXERCISE IN THE MANAGEMENT OF DIABETES MELLITUS.

Kris Berg, University of Nebraska at Omaha, Guyton W. Hornsby,
Medical University of South Carolina

The purpose of this symposium will be to review the research literature regarding the acute and chronic effects of exercise on diabetics. Following a review of these two topics, clinical implications will be addressed followed by a 10 minute question - answer period with the audience. While more than 10 million Americans are diabetics and while exercise is recognized in medicine as an essential component of diabetic management, suprisingly little attention has been given this population by professionals in health, physical education, and recreation. Very few professionals in our field have been introduced to the concerns and limitations of diabetics. The symposium should be of value to researchers in exercise physiology, specifically those with an interest in exercise metabolism and bioenergetics, and health, recreation and physical education practitioners who deal with diabetics in the schools, recreational setting, and adult fitness programs.

Kris Berg
School of HPER, 6100 Dodge St.
University of Nebraska at Omaha
Omaha, Nebraska 68182

Saturday, April 12
9:00-10:15 a.m.

REEXAMINATION OF FLEXIBILITY DEVELOPMENT - IMPLICATION FOR REHABILITATION AND EXERCISE PRESCRIPTION.

Paul Surburg, Indiana University, Alfred F. Morris, University of Illinois, Wendell P. Liemohn, The University of Tennessee

The purpose of this symposium will be (1) to synthesize research studies conducted by the presentors as well as other relevant studies concerning flexibility development and (2) to provide a framework for the reexamination of the use of flexibility exercises in the rehabilitation and conditioning of athletes. The back and lower extremity will serve as the locus of attention, for not only does the majority of data presented focus upon this area of the body but flexibility development of the thigh and back regions are pivotal areas for preventing certain types of activity injuries. Sports medicine personnel and individuals concerned with preventing injuries and ameliorating a component of physical fitness should find this symposium of interest.

Paul Surburg
Dept. of Physical Education
Indiana University
Bloomington, IN 47405

Saturday, April 12
10:45-12:00 p.m.

APPLICATIONS OF LABAN'S MOVEMENT PERSPECTIVE TO CURRICULUM AND INSTRUCTION IN PHYISCAL EDUCATION. Linda M. Lander, Pamela C. Allison, Bowling Green State University, Kate R. Barrett, Miriam Satern, University of North Carolina-Greensboro.

The purpose of the symposium is to identify applications of Rudolf Laban's movement perspective to curriculum and instruction in physical education. Laban's perspective of movement will be explained in terms of (a) his philosophy underlying his perspective, (b) the structure of his movement theory, and (c) application of the theory in various movement settings. Following this overview of Laban's movement perspective, three research papers will be presented to identify applications of his theory to curriculum and instruction. Two studies will identify the potential of his movement framework in categorizing movement observations of physical education teachers. The third paper presents a Model of Movement Preferences based on Laban's theory which can be used to predict activity preferences in physical education curriculum. The target audience for this symposium includes (a) those with interest in the work of Rudolf Laban, (b) preservice and inservice teacher educators, and (c) curriculum theorists and designers.

Linda M. Lander
Physical Education Professional Div.
Bowling Green State University
Bowling Green, Ohio 43403

Saturday, April 12
2:00-3:15 p.m.

PHYSICAL FITNESS ASSESSMENT AND PROGRAMMING RESEARCH FOR MODERATELY AND SEVERELY MENTALLY RETARDED ADULTS.

Garth Tymeson, Bo Fernhall Northern Illinois University, Paul Jansma, Jeff McCubbin, The Ohio State University, Philip Tomporowski, University of Alabama

The purpose of the symposium is to summarize, discuss, and provide recommendations for laboratory and field-based research related to physical fitness for moderately and severely mentally retarded adults. Presentations will synthesize past and current research in the following areas: (1) status and knowledge regarding cardiovascular fitness assessments utilizing laboratory and field tests; (2) impact of and programs for the development of health related physical fitness for mentally retarded adults; (3) the relationship between physical fitness development, mental development, and adaptive behaviors. Information presented will be of interest to professionals with involvement in adapted physical education at any level, and may be of special interest for researchers in physical activity for special populations, exercise physiology, exercise-related psychology, special education/rehabilitation.

Garth Tymeson
Physical Education Department
Northern Illinois University
DeKalb, IL 60115

Saturday, April 12
3:45-5:00 p.m.

A DECADE OF, AND CURRENT RESEARCH PERTINENT TO, GIRLS AND WOMEN IN SPORT. Lois A. Klatt, Concordia College, Jacqueline Puhl, United States Olympic Center, Patricia Eisenmen, University of Utah.

A presentation of the new and critical research in Girls' and Women's Sports. The program format will include: a) a review of current research across the wide spectrum of sports based upon the recent Women and Sports Science Conference and b) a unique approach to new information in nutrition and sports performance with injury prevention and technique analysis.

It is important during this critical time of Girls' and Women's Sports in the United States and abroad that our constituency be brought up-to-date on research completed within the last decade.

The target audience is NAGWS members and others interested in girls' and women's sports. The NAGWS has approved this as their official Research Consortium/Association Research Symposium.

Lois A. Klatt
Department of Physical Education
Concordia College
River Forest, IL 60305

Sunday, April 13
9:00-10:15 a.m.

OBESITY: HEALTH IMPLICATIONS AND INTERVENTION STRATEGIES.

Joseph E. Donnelly, Paul Bishop, Kearney State College, Steven Husen, Family Practice of Grand Island, Stephanie Sintek-Smith, Richard G. Israel, East Carolina University-Greenville

The purpose of the symposia is to provide information relative to the nature and scope of obesity and present a variety of intervention strategies. Health implications of obesity, will introduce the magnitude of the problem and discuss the physiology of obesity. Terms relative to types and classification of obesity will be discussed. The relationship of obesity to morbidity and mortality is emphasized. Intervention Strategy: a home based approach for children and adolescents, will illustrate programs which provide dietary and exercise protocols using parents as service providers. Intervention Strategy: medically supervised starvation and modified starvation programs, illustrates the physiological effects of starvation, assessments to assure safety, and expected results to body weight and composition, predicted goal weights, and work capacity. Intervention Strategy: surgical treatment, discusses criteria for candidacy, and results of surgery on various physiological parameters. It is expected that a discussion of obesity will attract a sizable and varied audience including personnel from public schools, business and industry, YMCA's, and health clubs.

Joseph E. Donnelly
Dept. of Physical Education
Kearney College
Kearney, Nebraska 68847

Sunday, April 13
10:45-12:00 p.m.

LEISURE AND WELLNESS. Hilmi Ibrahim, Whittier College, Michael A. Blazey, Washington State, Linda Thornton Hall, Florida State University, Liane M. Summerfield, Marymount College of Virginia

Leisure providers assume that there is a link between leisure behavior and wellness. Wellness, be it physical, mental, or social, may have an affect-effect relationship to the type of activity in which we participate during our free time. But what is the nature of the relationship? Is one physically fit because he is active, or is he active because he is physically fit to start with? Is one inquisitive because he is mentally alert, or is he mentally alert because he is inquisitive?
The purpose of this symposium is to first alert leisure researchers that the systematic study of this relationship between leisure behavior and wellness is needed, and, secondly, to explore the possible avenues which may be taken to conduct such studies.

Hilmi Ibrahim
Dept. of Physical Education
Whittier College
Whittier, CA 90608

Sunday, April 13
1:00-2:15 p.m.

THE EFFECT OF HIGH-CUT AND LOW-CUT BASKETBALL SHOES ON SUBTALAR JOINT PRONATION.

Donald H. Sussman and Joseph Hamill, Southern Illinois University

Limiting the amount and/or rate of subtalar pronation has been cited as a health concern by the researchers and clinicians. In basketball, high cut shoes have generally replaced low-cut shoes as one method of possibly reducing excessive pronation. The purpose of this study was, therefore, to investigate the effects of low and high cut basketball shoes on rearfoot motion during straight ahead running. Rearfoot motion has often been used as an indicator of subtalar pronation. Three healthy adults (2 females and 1 male) volunteered as subjects for this study and signed consent forms in accordance with University policy. The experimental set-up consisted of a LoCam high speed camera equipped with a 100 Hz pulse generator to verify film speed. Subjects were filmed while running on the treadmill producing a view of the lower leg and foot from the rear. Data sampling was accomplished at 100 Hz. Subjects were required to run at 3.58 m/s pace in both low and high cut shoes of the same make and type for 1 minute subsequent to which three consecutive right footfalls were filmed. The film was then digitized using a Numonics 1224 digitizer interfaced to an Apple II+ microcomputer. The rearfoot angles were obtained from the digitized data. The data were smoothed using a cubic spline function and rearfoot angular velocities were generated. From the angle-time and angular velocity-time data, mean values of the 3 footfalls for touchdown angle, maximum pronation angle, time to maximum pronation, total rearfoot motion, maximum pronation velocity and time to maximum pronation velocity were generated. Mean values for each subject/condition were evaluated using 6 correlated t-tests. It was found that the high cut basketball shoe permitted significantly less maximum pronation ($x=7.34°$) than the low cut shoe ($x=9.60°$). No significant differences were found in any other parameters although mean values for total rearfoot motion and maximum pronation velocity were lower for the high cut shoe than the low cut shoe. It appeared that high cut basketball shoes did reduce some aspects of rearfoot motion in straight ahead running. These data provide a preliminary basis for the investigation of the mechanisms of over-pronation and possibly lower extremity injury in basketball as a result of shoe type.

Donald H. Sussman
Department of Physical Education
Southern Illinois University
Carbondale, IL 62901

Thursday, April 10
9:00-10:15 a.m.

THE INFLUENCE OF LOWER EXTREMITY LOADING ON JOINT KINETICS DURING THE RECOVERY PHASE OF RUNNING.

Philip E. Martin, Exercise and Sport Research Institute, Arizona State University.

In the recent past, the influence of lower extremity loading, such as when manipulating footwear weight or when wearing ankle weights, has become an interest of sports and exercise scientists. Most of the past research on lower extremity loading has focused on the physiological consequences of the loading. It was the purpose of this study to consider this problem from a mechanical perspective by evaluating the effect of thigh or foot loading on the joint reaction forces and moments of the lower extremity during the recovery phase of the running cycle. Fifteen men performed treadmill running at 3.33 m/sec under five load conditions. These loads, which were randomly ordered for each subject, consisted of a control condition (no added load) and loads of 0.50 kg or 1.00 kg added to either the thighs or feet. A sagittal plane view of the subjects' running patterns was recorded for each load condition with a single Locam camera. Scaled and digitally filtered film coordinate data representing the segmental endpoints of the foot, shank, and thigh were used to calculate the kinematic characteristics of the segments. Standard link segment mechanics were then used to calculate the vertical and horizontal components of the joint reaction forces and the net moment for the ankle, knee, and hip, successively. The results of the study demonstrated that the joint reaction force and moment patterns with respect to time were essentially the same under the five load conditions except for selected magnitude differences. When load was added to the thighs, there was little change in the reaction forces and moments at the ankle and knee. There were, however, modest increases in these kinetic factors at the hip joint. In contrast to this, the results indicated that increases in the load on the feet resulted in systematic increases in the reaction forces and moments at all three lower extremity joints. When considered in combination with results of physiological analyses of lower extremity loading, the results of this study suggest that the increases in metabolic demand due to loading can be directly associated with increased demands on the lower extremity musculature rather than to some major modifications in the movement pattern. These results have interesting implications not only for the stresses placed on the musculoskeletal structures of the lower extremity but also for the mechanisms by which the nervous system controls the locomotion process.

Philip E. Martin
Department of Health & Physical Educ.
Arizona State University
Tempe, Arizona 85287

Thursday, April 10
9:15-9:30 a.m.

MECHANICAL AND PHYSIOLOGICAL CONSEQUENCES OF RUNNING WITH HAND AND/OR ANKLE WEIGHTS.

Susan J. Hall, Oregon State University; Alan C. Claremont, Oregon State University.

This investigation was conducted to examine the mechanical and physiological changes associated with running under three different weight-loaded conditions as compared to the unloaded condition. Eight volunteer subjects, five males and three females, ranging in age from 30 to 52, ran for thirty minutes on a treadmill (0% grade) at a self-selected pace under four different randomized loading conditions on four separate occasions. Conditions included 1) unloaded, 2) carrying weights in the hands, 3) with weights strapped to the ankles, and 4) both carrying hand weights and with weights strapped to the ankles. Each subject also underwent an exercise tolerance test on the treadmill for identification of maximal aerobic capacity. Respiratory gas exchange measurements were made at 5 min. intervals during each run. Heart rates were monitored by an ECG along with VO(2) determinations. A LoCam camera operated at 100 fps was used to collect brief film clips of each subject from side and rear views during minutes 1, 10, 19, and 28 of each trial. Analysis of the oxygen consumption data indicated that subjects loaded with both hand and ankle weights produced caloric expenditure increases ranging up to approximately half of the 30% increase popularly advertised as being attributable to the use of hand weights alone during exercise. Greater increases in caloric expenditure were typically produced by the use of the hand weights alone, as compared to the use of ankle weights alone. The digitized film records indicated greater deviation from "normal" kinematics with the use of hand weights alone as compared to ankle weights alone, with the use of hand weights generally decreasing ranges of motion at the shoulder and elbow joints and slightly increasing the amount of trunk flexion. It was concluded that the mechanical changes associated with the use of hand and/or ankle weights during running tend to minimize increased caloric expenditure and that the use of hand weights, in particular, tends to distort the kinematics of normal running form.

Susan J. Hall
Department of Physical Education
Oregon State University
Corvallis, OR 97331

Thursday, April 10
9:30-9:45 a.m.

A COMPARISON OF GROUND REACTION FORCES IN BACKWARD AND FORWARD RUNNING. C.W. Armstrong, P. Spyropoulos, F. Andres, Applied Biomechanics Laboratory - Department of Health Promotion & Human Performance, The University of Toledo, Toledo, Ohio 43606.

Backward running is a skill that is often used in sports such as football, basketball, soccer and team handball. Recently, interest has been expressed in it for fitness purposes, as an alternative to forward running. It is thought that backward running may counteract some of the strength imbalance between the hamstrings and the quadriceps that can occur from regular forward running. Also, it has been proposed that backward running may lessen the ground reaction forces experienced during support and may enable the foot and leg to function with increased efficiency in attenuating these forces. If this is the case, then backward running may have unique application in both clinical and recreational settings. Thus, the purpose of this study was to evaluate the ground reaction forces experienced during backward running and compare them to those encountered during forward running. Eight young adults volunteered to serve as subjects. Before testing, all were provided with the same style of running shoes, and were given the opportunity to practice backward running. Each subject performed trial runs across a force platform, at approximately 4.5 miles per hour, until five successful tests for each condition were completed. Data was sampled at 400 Hz, smoothed, and processed to provide information on 26 separate variables, representative of forces acting along the three orthogonal force axes. The results indicated remarkable similarity between the two conditions for many variables, but notable differences on others. The magnitude and duration of forces along the vertical axis were quite similar. However the pattern of these forces differed, with the peak force preceding the secondary peak in backward running and following it in forward running. The time of the peak force was similar in both conditions, occurring at approximately 38% of the total support time. Along the medial/lateral axis, unlike the forward condition, backward running was characterized by a large lateral impulse and almost no medial impulse. Although force amplitudes along the fore/aft axis were smaller, the backward condition was characterized by a rapid increase and decrease of force, interrupted by extended periods of near peak force.

Dr. Charles W. Armstrong
Dept. of Health Promotion & Human
Performance
The University of Toledo
Toledo, Ohio 43606

Thursday, April 10
9:45-10:00 a.m.

HUMAN MUSCULAR CONTRACTION: ROLE OF THE MECHANICAL COMPONENTS.

Rick N. Robertson, Ph.D., University of Oregon.

A regression model was developed for predicting torque output for human muscular contraction during a uniplanar arm extension maneuver. The predictor variables used in the model were developed during a series of 3 experiments, and represented the basic electrical and mechanical properties of contracting muscle. In Experiment 1, the relationship between the response of the series elastic component (SEC) and activation of the muscle was elucidated. This relationship was used to predict the response of the SEC during the various conditions of contraction in Experiment 4, for input into the regression equations. In Experiments 2 and 3, the maximum 3-dimensional torque-velocity-length volume was developed for each subject. Individual trial torque-velocity-length volumes were taken as a percentage of the maximum volume for each contraction trial in Experiment 4. These ratios were used in the regression analysis to represent the properties of the contractile component. The history of the active state was represented in the regression equations by the slope of the integrated EMG curve calculated to peak jerk and to peak torque. The ability of these variables to predict the torque output was tested over 27 conditions of contraction in Experiment 4. Three loads placed on the system, three starting muscle lengths, and three velocities of contraction were manipulated. It was shown that when the variables representing the appropriate electrical and mechanical properties of muscle were entered into a regression model, a large proportion of variance could be accounted for in predicting the mechanical output of the system. The best predictors were the ratios representing the torque-velocity-length properties. It was hypothesized that these properties not only represented the input from the contractile element but were also reflective of the inputs from the series elastic element and the active state due to their link to cross-bridge formation.

Rick N. Robertson, Ph.D.
Dept. of P.E. & Human Move. Studies
University of Oregon
Eugene, Oregon 97403

Thursday, April 10
10:00-10:15 a.m.

THE RELATIONSHIP BETWEEN OUTDOOR RECREATION AND ENVIRONMENTAL CONCERN: A RE-EXAMINATION OF THE DUNLAP-HEFFERNAN THESIS.

George R. Atkinson, Northeastern University.

The purpose of this study was to examine the relationship between outdoor recreation and environmental concern. The study investigated the relationship between outdoor recreation participation and environmental attitudes. The problem identified contained four elements: (1) the relationship between outdoor recreation participation and environmental attitudes; (2) the comparison of the relative effects of two different kinds of outdoor recreation activities on environmental concern; (3) the extent of outdoor recreation behavior's influence on two types of environmental issues; and (4) the effect of one's socio-economic status on outdoor recreation participation. Survey data was collected from a systematic sample of 700 households in the metropolitan Boston area. Information was gathered through a three staged mailed questionnaire. Variables examined were outdoor recreation participation, environmental concern, age, sex, income, education, occupational prestige, and occupational status. Environmental attitudes were measured by the Weigel Environmental Scale, a sixteen item Likert scale covering a broad range of environmental issues. Data was analyzed with Pearson correlations, step-wise and hierarchal multiple regression. The study revealed support for the notion of outdoor recreation participation supporting pro-environmental attitudes. Multiple regression analysis established outdoor recreation, age, and education as the three independent variables which contributed significantly to environmental concern (betas ranging from .243 to .263). Participation in "appreciative" outdoor recreation activities was a more powerful indicator of environmental concern than "consumptive" outdoor recreation activities. Concern for the environment was stronger regarding those environmental issues more central and necessary to the recreationist's interest. In contrast to other previous related studies, socio-economic variables failed to produce significant betas when regressed on outdoor recreation participation habits. The results of the study have implications for attitude-behavior consistency models, recruitment and program planning of voluntary environmental groups, and public policy decision makers.

George R. Atkinson
Department of Health, Sport, and
Leisure Studies
Northeastern University
Boston, MA 02115

Friday, April 11
10:45-11:00 a.m.

DEVELOPMENT OF A COMMUNITY REFERENCED LEISURE SKILL/FACILITY INVENTORY AND TRAINING PROGRAM FOR MULTI-HANDICAPPED PARTICIPANTS. Michael E. Crawford, University of Missouri; Kathleen Cornwall, University of Nebraska at Omaha.

Within the last few years human service professionals have attempted to provide service to disabled individuals in community and non-institutional settings according to Least Restrictive Environment (LRE) doctrine. Recreational programming short of the LRE goal results in the acquisition of leisure skills that meet sub-standard performance demands (low quality behavior). The purpose of this study was to explore the development of procedures for generalizing lifetime leisure skills acquired by multi-handicapped participants in segregated settings to natural community environments. The study tested the applicability of contemporary educational theories and behavioral engineering techniques when structured within a recreational service delivery model for the multi-handicapped. A two phase project utilizing an ABAB reversal design was utilized. In phase one individualized behavioral experiments employing multiple baseline within subject designs were implemented to teach a lifetime leisure skill to multi-handicapped adolescents (N=10). In phase two trainers developed generalization strategies for the leisure behaviors established in the segregated setting and attempted transition to natural community recreational environments. Findings included; (1) empirical verification with research subjects for task and activity analysis procedures in constructing successful behavioral programs, (2) a validated inventory technique for assessment of leisure behavior in natural recreation settings, and (3) empirical verification of the effectiveness of various adaptation hypothesis and instructional strategies with research subjects. An effective demonstration of the relevance and applicability of systematic, frequent, small group instruction for the multi-handicapped in community settings was achieved for 50% of the subjects involved. Future investigations should focus on (1) an elaboration of methodology including the use of family members as trainers, and (2) development of inservice guidelines and communication strategies for working with personnel in natural community recreational settings.

Michael E. Crawford
Recreation and Park Administration
University of Missouri-Columbia
Columbia, Missouri 65211

Friday, April 11
11:00-11:15 a.m.

POST-ASSAULT LEISURE CHOICES OF SEXUAL ASSAULT VICTIMS: IMPLICATIONS FOR LEISURE AND HEALTH PROFESSIONALS.

Emilyn Sheffield, University of Houston; Alex Waigandt, University of Houston; Deborah Miller, The College of Charleston.

Although various researchers have examined the physiological and psychological consequences of sexual assault there has been little research into the postrape leisure choices of rape victims as they attempt to stabilize and reorganize their lives. The present study examines the postrape leisure choices of 51 sexual assault victims. All subjects completed the Cornell Medical Index (CMI). For the purposes of this study, the CMI was subdivided into three categories. Category one included responses to past and present illness symptoms. Categories two and three dealt with personal and social leisure choices. Data were analyzed using the Statistical Package for Social Sciences. Measures of central tendency and ANOVA are reported. Findings indicate that sexual assault victims with fewer maladaptive responses during the reorganization phase of rape trauma syndrome are more inclined to take time for exercise, rest, and relaxation than are their less well adapting counterparts. Additionally, the victims with fewer maladaptive responses are more inclined to see friends and go out. Educational and administrative implications of the data will be addressed in two categories. A rationale describing the importance of health and leisure education will be developed. A model of desirable health and leisure coping strategies for use by educators and counselors will also be distributed.

Lyn Sheffield
Department of Health, Physical
Education and Recreation
University of Houston
Houston, TX 77004

Friday, April 11
11:15-11:30 a.m.

RECREATION AND THE RETURNING FEMALE STUDENT.

M. Deborah Bialeschki, University of North Carolina-Chapel Hill

Women returning to college after an interruption in their formal education are a common phenomenon in colleges and universities today. The purpose of this study was to evaluate the leisure attitudes and recreation participation patterns of a sample of returning female students.

The study was conducted in the fall of 1983 with a random sample of female students at the University of Wisconsin who had returned to graduate school after a five year lapse in their formal training. Personal interviews were conducted with 36 full-time students. The interview questions included general demographic characteristics, an assessment of leisure attitudes, a listing of barriers to leisure, and an inventory of activities participated in over the pasz two years.

In general, the women interviewed had been away from an academic setting for almost eight years. Less than half were married and two-thirds of them were currently employed for more than 21 hours a week. All the women interviewed were happy about their decision to return to school.

The women placed a high value on the cognitive and affective aspects of their recreation activities. However, the scores concerning their behavioral attitudes were lower indicating that incongruity existed between what the women thought and felt about recreation and what they did in regard to their actual activities.

The greatest barriers to recreation were related to not enough time, work and school being the highest priorities, and too much daily stress. The returning students said they participated less in mass media, social, outdoor, sport, and hobby activities when they returned to school.

The study suggested implications for those who may be programming for women who are returning to school. With the growing number of returning students, traditional student activity and sports programs may not be the best methods for supplementing the recreational needs of this group of students.

M. Deborah Bialeschki
University of North Carolina -
Chapel Hill
208 Pettigrew Hall-058-A
Chapel Hill, NC 27510

Friday, April 11
11:30-11:45 a.m.

EFFECTS OF UNEMPLOYMENT ON THE LEISURE SATISFACTION OF UNEMPLOYED STEELWORKERS. Lisa C. Pesavento Raymond, Chicago State University.

The purpose of this study was to examine the effects of unemployment on the leisure satisfaction of unemployed steelworkers. Earlier studies indicated that leisure satisfaction appeared to decrease significantly under the impact of unemployment during the Depression. This study updates and extends such previous research. A self-report survey was utilized to gather data on 240 unemployed steelworkers on Chicago's southeast side. The study population was drawn from Republic Steel's union facility site, Local 1033. Survey development revolved around the Depression studies and solicited selected demographic, behavioral, and attitudinal information pertaining to life and leisure satisfaction. The method of analysis included both crosstabulation and analysis of variance to examine relationships between variables. Data analysis indicated that level of life satisfaction dropped significantly after unemployment while the level of leisure satisfaction showed a lesser decline. Level of leisure satisfaction was significantly related to level of life satisfaction after unemployment. Before unemployment, over 66% of the respondents had high levels of both leisure and life satisfaction and only 33% did when unemployed; a decrease of 50%. Those who were highly satisfied before were more likely to reflect a change (decrease) after unemployment. This was primarily due to a decrease in life satisfaction rather than leisure satisfaction. Fewer respondents indicated a change from high levels of leisure satisfaction to lower levels after unemployment. Of the demographic variables analyzed, only marital status and age were significantly related to change in leisure satisfaction at the .05 level. Married individuals and/or those in the 40-49 age category experienced a greater drop in leisure satisfaction than others in the sample. Sex, race, length of unemployment, and financial buffers were not significantly related. However, comparing the relationship between life and leisure satisfaction before unemployment to that of after unemployment, it was evident that the overall relationship between the two remained quite high. This sample did not demonstrate the radical decrease in leisure satisfaction that appeared to occur during the Depression. Further research into the leisure lifestyles of the unemployed is necessary if both physical educators and public and private leisure providers are to meet the needs of this persistent segment of the population.

Lisa C. Pesavento Raymond
Assistant Professor
Chicago State University
95th Street and King Drive
Chicago, Illinois 60628

Friday, April 11
11:45-12:00 p.m.

THE INFLUENCE OF HEALTH VALUES AND LOCUS OF CONTROL ON SUCCESS EXPECTATIONS AND PERFORMANCE IN A FITNESS CLASS.

Jo A. Carter, Karen M. Greenockle, and Amelia M. Lee, Louisiana State University

The purposes of this study were (1) to examine the influence of locus of control (LOC) and health value on the initial fitness level, success expectations, and effort ratings of University females enrolled in an aerobic dance class, and (2) to determine the relationship between relevant psychological variables and a measure of cardiovascular fitness. The participants were 101 female students who completed a semester of aerobic dance. All subjects were administered the Multidimensional Health Locus of Control (MHLOC) and a Value Survey to enable classification into LOC groups (internal, external) and fitness value groups (high, low). A 12-minute run/walk test was given at the beginning and end of the semester. An expectancy measure was obtained by having each subject set an exercise goal and rate, on a 1-5 point scale, their chance of reaching the self-selected goal. Effort was measured by having the subjects rate how hard they were willing to work to reach the set goal. The students participated in a 40-minute, 3 days a week structured aerobic dance class for 15 weeks. A 2 (internal, external) x 2 (high, low) x 2 (pretest, posttest) ANOVA with repeated measures on the last factor was computed for the fitness data. Two separate 2 x 2 ANOVAs were computed for expectancy data and effort ratings. Correlations were computed for LOC variables, expectancy rating, and effort ratings. Findings indicated that the high fitness group, regardless of LOC scored higher on the 12-minute run test. A LOC x fitness value interaction for the expectancy data revealed that for the high fitness value group, both students who were internal and external had approximately the same expectations for success. For the low fitness value group, there was considerable difference in expectancy scores with the internals significantly higher. Both internals and high fitness value groups had significantly higher mean effort ratings. Finally, significant correlation coefficients in the expected direction were evident for the psychological variables and the measure of fitness. It was concluded that individuals who place a high value on fitness are in fact more fit. Results also supported the notion that health LOC and health values are important in determining how much effort an individual is willing to exert and have an interactive effect on the confidence shown in a training program. Therefore, high health and fitness values need to be encouraged and reinforced at an early age to ensure continued participation in fitness activities throughout adulthood.

Karen M. Greenockle
School of Health, Physical Education,
Recreation and Dance
Louisiana State University
Baton Rouge, LA 70803

Friday, April 11
3:45-4:00 p.m.

ADOLESCENT STRESS, SELF-CONCEPT AND TOBACCO USAGE: AN EXPLORATORY STUDY. John A. Bonaguro, Ohio University; Ellen W. Bonaguro, Ohio University.

The purpose of this study was to examine the relationships between adolescent stress, self-concept and tobacco usage among adolescents. The utility of this information would be helpful for designing health promotion interventions to prevent the onset of cigarette use.

The sample consisted of 1,055 adolescents in grades four through twelve in two southeastern Ohio counties. The sample was selected to control for geographic location with two rural and two urban classes per grade level. The students completed a self-administered questionnaire on tobacco usage, HARE Self-Concept Scale, and Adolescent Symptomatology Stress Scale.Internal reliability (alpha) for tobacco usage was .78, HAPE .73, and stress .90. MANOVA was used to determine significant differences on stress and self-concept between users and non-users of cigarettes, with age as a covariate.

There was a total of 1,044 usable questionnaires (532 female and 512 male) in grades 4 through 12. The mean age was 13.5 (stddev 2.7). Multivariate analysis revealed main effects upon self, home, peer esteem levels, and stress (Wilks = .916; F = 15.1, p/ .000). Univariate tests showed significant differences for self-esteeem, home-esteem, and stress. Users of cigarettes tend to have lower esteeem levels and report significantly higher symptoms of stress.

Health promotion efforts to prevent onset of cigarette usage need to consider the importance of self and home esteem, and the role of adolescent stress. The promotion of self-concept seems to be one of the most promising strategies for fostering healthy behaviors during adolescence.

John A. Bonaguro, PhD
Director, Health Promotion and
Research Division
Ohio University
Athens, OH 45701

April 11, 1985
4:00-4:15 p.m.

A LONGITUDINAL STUDY OF ADOLESCENT HEALTH CHARACTERISTICS AND BEHAVIORAL RISK INDICATORS.

O. Matthew Adeyanju, University of Kansas; William H. Creswell, University of Illinois; Donald Stone, University of Illinois; David Macrina, University of Illinois; Akbar Davami, Illinois State University.

The main purpose of the current study (84/85) was to identify the precursors and determinants of the development and maintenance of behaviors in adolescents conducive to cardiovascular health. The study also focused on monitoring and tracking the previously classified (1981/82) "at-risk" students. A sample of 935 high school students in Central Illinois, with baseline ages 14-16, was followed-up for four years (1981-85). Selected biomedical measures of blood pressure--(systolic and diastolic), triceps skinfold thickness, Body Mass Index (BMI), Percent Ideal Body Weight (PIBW), anthropometric, socio-demographic, and self-reported behavior and attitudinal variables were assessed. Subjects were initially and currently identified as "potentially at-risk" if their biomedical measures equaled or exceeded the 75th percentile ranking for their age, sex and racial group. Analysis of data included the McNemar's statistical test of symmetry, chi-square, ANOVA, t-test, Pearson Moment Correlation, principal factor analysis and stepwise multiple regression analysis. Results indicated that a high proportion of the "at-risk" potential group had negative health behavioral characteristics--(smoking, exercise, diet and alcohol intake); although there was no statistically significant associations between the potentially health compromising behavior and "at-risk" characteristics of the adolescents. About 18% of the matched cases tracked in two or more risk indicators over the four years. Among the sex-race groups, white males and non-white females showed a higher tracking tendency in the "at-risk" category. About 15% of the sample were obese (i.e. both overweight and overfat) according to the criteria adopted for this study. Major predictors of blood pressure in this adolescent sample as determined by Stepwise multiple regression analysis included BMI, pulse, PIBW, triceps skinfold, smoking, alcohol consumption, stress level, race, mother's and father's education and type of work done by both mother and father of the respondents. The study identified "potential high risk group" of adolescents for future chronic diseases. Therefore, efforts should be directed to the adolescent years to prevent or retard the developmental stages of chronic disease most especially cardiovascular diseases. Programs that could modify lifestyle behavioral changes need to be developed for this age group.

O. Matthew Adeyanju, Ph.D.
Department of HPER
160 Robinson Center
University of Kansas
Lawrence, KS 66045

Friday, April 11
4:15-4:30 p.m.

AN INVESTIGATION OF COGNITIVE DEVELOPMENT AND THE DECISION MAKING DYNAMICS OF ADOLESCENTS.

Michael J. Hammes Ph.D., University of New Mexico.

The investigation attempted to examine adolescents' cognitive development and the decision making dynamics of adolescents. Subjects consisted of 94 students in the eighth, ninth, tenth and eleventh grades from Montana and New Mexico. Cognitive development was ascertained by qualitatively measuring subjects written responses to a health related scenario. Written responses were evaluated by a panel of judges who were trained in the theoretical tenets of cognitive development and tested to develop interrater reliability. A reliability coefficient of .75 was derived from the tests, thus, potential internal threats to validity due to instrumentation was minimal. Students also responded to questions pertaining to the amount of time they deliberated in making a decision, the affects of perceived emotional stress on their decision, identifying all possible decisions they would have to make in the health scenario, and finally, their final decision being health promoting or health risky. Results indicate 31 of 94 subjects or 33% had developed abstract thought and 63 or 67% had remained at the concrete level of operations. Moreover, 36% of males had developed abstract thought as compared to 29% of females. More importantly, only 41% of abstract thinkers made a health promoting decision as compared to 51% for the concrete thinkers. However, abstract thinkers' decision was less affected when asked if their decision would be the same if they were emotionally upset. That is, 54% made a health promoting decision as compared to 45% for the concrete thinkers. Furthermore, 45% of abstract thinkers made their decision instantly or after a few seconds as compared to 51% of the concrete thinkers, and 22% of the abstract thinkers deliberated from 30 seconds to a minute as compared to 16% of the concrete thinkers. The data also suggest that 62% of the abstract thinkers identified most of the potential decisions they would have to make in the health scenario as compared to 41% for the concrete thinkers. Interpretations may be made that abstract thinkers have a better decision making process, yet have difficulty in making a health promoting decision. Perhaps, this is due to insufficient knowledge needed for identifying potential concerns for the alternative choices generated. Therefore, it seems imperative curriculum designers develop teaching strategies that enhance abstract development and also provide sufficient knowledge pertaining to the potential concerns of the possible generated alternatives to a risky situation. Thus, improving the decision making process of our youth.

Michael Hammes, Ph.D.
Health Education Program
University of New Mexico
Albuquerque, NM 87131

Friday, April 11
4:30-4:45 p.m.

THE MORA EXPERIENCE: DRUG AND ALCOHOL PREVENTION IN A RURAL, HISPANIC ENVIRONMENT.

Elias Duryea, Eugene Romo, Tonya Dempsey, University of New Mexico; Jebose Okwumabua, University of Alabama.

The intent of this research was to measure the extent to which a rural, purely Hispanic school system would accept, jointly develop, implement and evaluate a preventive alcohol and drug intervention. Prior experience of health education specialists in the target community was extremely negative. The current research team utilized the anthropological concept of "homophily" to gain acceptance and collaboration from the community leaders. "Native sons" and other Hispanic individuals on the research team helped persuade school officials and teachers of the need for them to take central responsibility for correcting the drug problem in the school system. Previous visits to the community by health educators were unsuccessful because officials were told that the visiting specialists alone would reduce the alcohol and drug problems. This strategy violated precepts from community organization theory which proposes that community gatekeepers see both a need for an intervention and their own responsibility for its development, implementation, evaluation and revision. After a series of meetings with teachers, public health nurses and school officials a year-long series of treatment modalities were adopted and presented to the 7-9 grades in their regular science classes. Videotapes, films, role play vignettes, question-answer panel, choice dilemma techniques and responding to dares exercises were among the program components. A baseline needs analysis utilizing ANOVA was conducted before and after program completion using the new seventh-grade students as the only comparison group and pre-and posttest measurements of eighth and ninth-grade students as the other change assessment. This kind of evaluation was necessary because the first half of the program ended with the school year. Results showed that the program significantly reduced alcohol-related behavior but failed to register the same result for drug use ($p<.05$). Since the target school system has no comparable school system in its immediate or even its extended vicinity, the luxury of a control school was not available. This study's outcomes present an optimistic view for future, rural health education program acceptance and efficacy in Hispanic settings. Moreover, because of the intervention's success this first year it has been given an indefinite acceptance for continuation in the community. The implications from this study suggest that health behavior investigations can be perceived as salient by isolated entities if appropriate preliminary steps are taken to insure that cultural sensitivities are addressed.

Elias J. Duryea
Health Education Program
The University of New Mexico
Albuquerque, NM 87131

Friday, April 11
4:45-5:00 p.m.

AN ALTERNATIVE INDEX FOR CROSS-VALIDATING REGRESSION EQUATIONS. Stephen A. Zinkgraf, University of Texas Health Center at Tyler; Teresa McClendon, Texas A & M University.

Regressions equations are commonly used in many areas of exercise science. They are used to predict body density from skinfold measurements, maximum oxygen uptake from submaximal stress tests or performance times in endurance activities from training variables. For these equations to be useful to the exercise scientist, they must be generalizable across samples. Statistics commonly used to cross-validate regression equations are the cross validated R-square, the root mean squared error or the standard error of estimate resulting from regressing sample values on predicted values. While these are all reasonable cross-validation statistics, they do not always indicate the degree to which a regression equation is generalizable to a sample. The purpose of this paper is to present an alternate index of generalizability to be used in cross-validating regression equations. The index is the observed proportion of absolute errors of prediction within a prespecified value of which is noted at P(x). For example, in predicting the marathon performance of subjects in one sample with equations from another sample, P(10) would be the proportion of subjects whose actual marathon time was within plus or minus 10 minutes of the predicted values.

Data from two studies are used to demonstrate the P(x) statistic. The first study replicated a study that generated a set of regression equations to predict marathon performance from training data. While cross-validated R-square dropped from the orginal sample to the new sample, the P(x) statistics were stable from one sample to the other. If one were to view only the more traditional cross-validation statistics, one might question the generalizability of the original equations, but upon inspecting the P(x) statistic, the evidence indicated the original equations were quite generalizable.

The second set of data resulted from a study to determine how well maximal ventilation (VEMAX) could be predicted from forced expiratory volume in one second (FEVI). Several equations from other studies were evaluated. Since there was only one predictor variable (FEVI), the cross-validated R-square was useless because it was the same for all equations. The P(x) statistic performed well in identifying a subset of equations that were generalizable to this sample.

The P(x) statistic is a useful and practical tool in evaluating regression equations across samples.

Stephen A. Zinkgraf, Ph.D
Dept. of Epidemiology/Biomathematics
University of Texas Health Center
P.O. Box 2002
Tyler, Texas 75710

Saturday, April 12
11:00-11:15 a.m.

APPLICATION OF GENERALIZABILITY THEORY TO VARIATIONS IN TOTAL BODY CENTER OF GRAVITY VALUES. Sarah L. Smith, Rutgers University; Marilyn A. Looney, University of Iowa; Barbara L. Warren, University of New Orleans.

Previous approaches to establishing reliability for the digitizing process have been single-faceted, that is, only intraplotter or interplotter error has been investigated. Since there are several error sources, an approach should be taken that not only determines the contribution of each source to measurement imprecision but interactions of these sources as well. The purpose of this study was to use generalizability theory to examine the sources of variability of total body center of gravity (COG) values calculated by the segmental method. The sources of variability included are: subject, plotter, sequence, subject by plotter, subject by sequence, plotter by sequence, and subject by plotter by sequence. Twenty-eight college-aged students (males=14; females=14) were filmed by a LOCAM high speed camera at 100 fps while performing the basic locomotion skill of walking. Each subject was attired in shorts, short sleeve shirt, and athletic shoes. Film analysis was conducted on each subject using 6 frames of film depicting a one stride walking cycle consisting of rt heel strike, rt foot flat, lf toe off, lf heel strike, lf foot flat, and rt toe off. Two different digitizing sequences were used on alternate days by the two plotters. All 19 segmental endpoints were digitized in a specified order for each film frame in Sequence 1. Sequence 2 required the digitizing of each segmental endpoint in all 6 frames of the stride cycle. Four COG values were then determined for each person filmed in each of the 6 positions of the stride. X and Y coordinates for these COG values were analyzed separately by the BMD8V computer program using a fully crossed 3-way design. For all frames, the major-contributor to score variance was the variation among subjects. Percentages of total variance ranged from 76 to 79 and from 80 to 84 for the X and Y coordinates, respectively. However, 11 to 16% of the variance was attributed to the subject by plotter by sequence term for both coordinates. To assist with interpretation, 68% CIs were constructed. For a popular digitizing scheme it was found that an individual's universe COG could be within ± 20.93 cm in the horizontal plane and ± 5.99 cm in the vertical plane. COG estimates may be more imprecise than currently thought and the degree of COG displacement through the vertical and horizontal planes may affect the precision of the estimated universe score.

Sarah L. Smith
Dept. of Health, Physical Education
and Sport Studies - Rutgers Univ.
New Brunswick, N.J. 08903

Saturday, April 12
11:15-11:30 a.m.

IDENTIFYING RANGE EFFECTS IN HUMAN PERFORMANCE RESEARCH. Janet K. Wigglesworth, Indiana University, Harold H. Morris, Indiana University.

Range effects are biases introduced by the repeated measurement of subjects under different levels of a quantitative variable (Poulton, 1973). A range effect can influence the choice of an optimum condition. Therefore, researchers should be aware of methods useful in designing studies that can detect the presence of such phenomena. The purpose of this investigation was to determine the presence of possible range effects in a submaximal force estimation task. Twenty-four subjects were randomly assigned to one of two groups and were individually measured on three days. Subjects assigned to Group 1 were required to exert 10, 20, 30, 40, 50, and 60 percent of their maximal voluntary contractile (MVC) strength in a Latin square arrangement while subjects in Group 2 were required to exert 40, 50, 60, 70, 80, and 90 percent MVC. Constant error, variable error, and the absolute value of constant error were determined for each subject. The data were subjected to analysis of variance procedures to assess the effects of order and the percent MVC within the two independent series. The effects of percent MVC and treatment groups were determined in a separate analysis. Constant error and variable error were found to be significant within each of the two groups while the absolute error was not significant. Only constant error was found to be significant in the group by percent MVC analysis. The interaction between groups and percent MVC was not significant. These results sustain previous research concerning the relationship between percent MVC and the accuracy and consistency of submaximal force estimation. It may be concluded that submaximal force estimation is characterized by an overestimation of relatively low percentages of MVC and an underestimation of relatively high percentages of MVC. Of primary importance to this investigation was the failure to find a significant interaction between the groups and the percent MVCs. This led to the conclusion that the repeated measures design did not introduce a range effect bias in the estimation of submaximal force. It may be concluded that repeated measures designs do not always introduce range effects as previously suggested by Poulton (1973) and that the design and analysis strategies employed in this study are useful in detecting the presence or absence of such effects.

Janet K. Wigglesworth
Department of Physical Education
Indiana University
Bloomington, IN 47405

Saturday, April 12
11:30-11:45 a.m.

WITHIN VERSES BETWEEN SUBJECTS DESIGNS IN THE ANALYSIS OF SUBMAXIMAL FORCE ESTIMATION. Michael G. Lacourse, Harold H. Morris, Gary Kamen, Indiana University.

Various motor skills require that the performer accurately and consistently exert a specific submaximal force on an implement. Previous investigations have shown that performers tend to consistently overestimate low percentages of maximal force (PMF) and underestimate high PMFs. In prior studies the performer completed a series of maximal voluntary contractions (MVC) prior to the perception trials. These MVCs served as anchor stimuli for the perception trials (Helson, 1964). The purpose of the study was to examine the effects of variation in the type of design (between verses within subjects) and the magnitude of the anchor stimuli upon the accuracy and consistency of submaximal force estimation. Sixty-four male and female students served as subjects. Subjects were randomly assigned to one of two anchor conditions, either high intensity (MVC) or low intensity (5% of MVC) and to one of four design groups. Subjects assigned to Group 1 were instructed to exert 25, 50, and 75 percent of their MVC in a repeated measures protocol. Subjects in Groups 2, 3, and 4 were instructed to exert either 25, 50, or 75 percent of MVC, respectively. A factoral arrangement of treatments using a technique developed by Erlebacher (1977) was used to analyze the effects of design and PMF, and, of specific interest to the study, the design by PMF interaction on constant error, variable error, and the absolute value of constant error. There was no significant interaction either between design type and PMF, nor, in a second analysis, between anchor stimulus and PMF. This was true for constant error, variable error, and the absolute value of constant error. The mean constant error values of .73kg, and -2.30kg, and -3.76kg for 25, 50, and 75 percent MVC, respectively, were found to be significantly different ($F(2,66) = 10.17$; $p < .01$). The mean values for the absolute value of constant error were 3.13kg, 4.81kg, and 5.35kg for 25, 50, and 75 percent MVC, respectively, and were also significantly different ($F(2,43) = 6,37$; $p < .01$). The values of variable error did not differ significantly. It was concluded that the accuracy of submaximal force estimation was related to the magnitude of the PMF. Further, that the nature of the experimental design did not influence either the accuracy nor consistency of submaximal force estimation. Thus it is argued that variation in submaximal force estimation is influenced by the psychophysical properties of the task rather than the characteristics of the experimental design.

Michael G. Lacourse
Department of Physical Education
Indiana University
Bloomington, IN 47405

Saturday, April 12
11:45-12:00 a.m.

A COMPARISON OF THREE MODELS FOR ESTIMATING PSYCHOMOTOR TEST BATTERY RELIABILITY. Terry M. Wood, Oregon State University; Margaret J. Safrit, University of Wisconsin-Madison.

This study compared the sampling variability of three multivariate models for estimating psychomotor test battery reliability--the canonical reliability model (Conger & Lipshitz, 1973), the maximum generalizability model (Joe & Woodward, 1976), and the canonical correlation model (Wood & Safrit, 1984). A computer data-simulation procedure generated 1,000 data sets under each of 12 conditions. Each data set symbolized a test-retest reliability study of a hypothetical psychomotor test battery. Each data set also represented a random sample of size $\underline{n}$ ($\underline{n} = 50, 110, 136$, or 250) drawn from a population with specified distribution shape (normal, skewed, or double exponential) and specified population subtest means, standard deviations, intercorrelations, and univariate reliabilities. Estimates of the multivariate reliability coefficients associated with each model were computed, resulting in 1,000 values for each estimator under each condition. Employing these values, sampling distributions were constructed for each estimator under each condition. The models were compared on the basis of sampling distribution characteristics of the estimators and the properties of consistency, relative efficiency, and bias. The most significant finding of these analyses was that all estimators evidenced consistency, an acceptably small degree of bias ($< .025$), and with the exception of the canonical reliability and canonical correlation estimators when $\underline{n} = 50$ and the data were non-normal, the errors of estimation were acceptably low ($< .067$). However, over all estimators, skewed data sets and data sets with $\underline{n} = 50$ were associated with the largest errors of estimation, the greatest degree of bias, and negatively skewed sampling distributions. When employing these models it is recommended that data be normal in form and that sample sizes be in excess of $10(2 \times \underline{c}) + 50$ where $\underline{c}$ is the number of battery subtests.

Terry M. Wood
Department of Physical Education
Oregon State University
Corvallis, OR 97331

Saturday, April 12
10:45-11:00 a.m.

AUDITING QUALITATIVE RESEARCH: A TECHNIQUE FOR ESTABLISHING THE DEPENDABILITY AND CONFIRMABILITY OF NATURALISTIC INQUIRIES.

Thomas Steen, University of North Dakota.

One of the main characteristics of good research is that it is carried out and reported in such a way that it can be publicly inspected. Unfortunately, most qualitative research does not lend itself to public inspection and consequently has been criticized for being less rigorous than research in other traditions. The research audit, modeled after the financial audit, has been suggested as a potential solution to this problem. Following guidelines proposed by Lincoln and Guba (1982), research audits were recently conducted for two qualitative research projects in physical education. An auditor, an independent professional peer of the researcher, was assigned to examine the raw data, the audit trail, and the final report. The auditor assessed the inquiry process for reliability and the inquiry products for absence of bias. The auditor's report was attached to the research report. At the completion of the projects, the researchers and selected reviewers concluded that the audits, although time-consuming, helped establish the dependability and confirmability of the research and that future qualitative research would profit from similar procedures.

Thomas Steen
University of North Dakota
Department of Health, Physical
Education and Recreation
Grand Forks, ND 58202

Saturday, April 12
2:00-2:15 p.m.

COMPARISON OF INDUCTION TEACHERS WITH AND WITHOUT A FIELD EXPERIENCE DURING TEACHER PREPARATION: A LONGITUDINAL STUDY PART II.

Paul C. Paese, Southwest Texas State University.

A major void in RTE-PE is the lack of research completed that longitudinally assesses interns teaching skills as they progress through a teacher preparation program and subsequently into the teaching profession (Locke, 1984). The significance of this study was that it did complete a 6 year longitudinal study that actually assessed the teaching skills of its graduates who were induction teachers in the public schools. The purpose of this study was to assess if differences still occurred in teacher effectiveness between induction teachers who had one secondary field experience prior to student teaching and those who did not. Eighteen secondary school physical education teachers in their third year of teaching were used as subjects for the study. All 18 subjects were involved in Part I of the study (Paese, 1984). Phase one of this study included 2 unannounced observations and phase two included 2 announced observations in which feedback was given to teachers on teaching skills. All observations were videotaped and coded using the Academic Learning Time Observation System (Siedentop, Tousignant & Parker, 1982). Reliability was measured twice during each phase of the study using the scored interval method of calculation. Tests of significance between and within groups on all variables were completed during both phases of the study. The major results of the study are as follows: (1) No significant differences between groups in engaged motor, ALT, instruction, management and activity time. The only variables of significance were feedback rate and specific feedback in favor of the field experience group of teachers ($p < .05$) and higher student motor engagement during activity with the non field experience teachers ($p < .05$). (2) During the supervision phase of the study the field experience group of teachers had significantly less management, more activity, and specific feedback ($p < .05$). (3) For total observations made, induction teachers with field experience had higher rate of instruction, activity time and specific feedback ($p < .05$). (4) Teachers within the field experience group made significant improvements from phase one of the study through phase two in activity time and specific feedback ($p < .05$). Induction teachers without field experience made no significant improvement in criterion variables and in fact significantly decreased in engaged motor, and percent of student engagement during activity time ($p < .05$). In conclusion, induction teachers who had a field experience during teacher preparation were still more effective teachers through the induction phase of their teaching career.

Paul C. Paese
Dept. of HPER, Jower Centers A145
Southwest Texas State University
San Marcos, Texas 78666-4616

Saturday, April 12
2:15-2:30 p.m.

A COMPARISON OF ACHIEVEMENT OF STUDENTS TAUGHT PSYCHOMOTOR SKILLS USING MASTERY LEARNING, NON-MASTERY, AND NO-DRILLS METHODS. C.L. Blakemore, Brigham Young University; and P. Roland, Provo School District.

Mastery Learning, as proposed by Bloom, has long been supported by the literature as a successful instructional system. However, very little research has been done applying Mastery Learning techniques in the physical education setting. The purpose of this study was to measure the effect of Mastery Learning on achievement of junior high school students when performing certain volleyball skills. Eighty-nine 7th grade and one hundred 8th grade students enrolled in daily co-ed physical education classes were randomly assigned, by class, to a treatment group for six weeks. In both the 7th and 8th grades, an experienced instructor taught one class using Mastery techniques (50% of class must reach a predetermined high level of achievement before a new skill is taught); and one class using non-mastery techniques (skills were introduced, demonstrated, and practiced according to a pre-planned calendar). A class, who were not taught volleyball skills, was the control group. A third treatment group in which students played the game with no formal instruction (no-drills) was part of the 8th grade model. Students were tested three times (pre-mid-post) on four volleyball skills to measure achievement. A three item motor ability test was administered during the pre-test to determine aptitude. Two months after the post-test, students were again evaluted to measure retention. A repeated measures analysis of covariance revealed the following major findings at the post-test: 1) 8th graders in Mastery classes achieved significantly higher ($P<.01$) than any other group. 2) Both males and females in the 8th grade Mastery group achieved significantly higher ($P<.02$) than any other group. 3) Both high and low aptitude students in the 8th grade Mastery group achieved significantly higher ($P<.01$) than any other group. 4) Differences in 7th grade achievement were not significant except when the two skills taught during most of the Mastery class were used for computation. In this case, 7th graders in the Mastery group achieved significantly higher ($P<.03$) than any other group. The 8th grade control group scored higher at the post-test than the no-drills group, although the results were not significant. The rate of retention was not significantly different for any group. This research suggests that Mastery Learning is an important methodology for improving acquisition of psychomotor skills and the study should be repeated to establish reliability.

Connie L. Blakemore
Physical Education
Brigham Young University
Provo, UT 84602

Saturday, April 12
2:30-2:45 p.m.

THE EFFECT OF AN INTERVENTION ON ACADEMIC LEARNING TIME IN PHYSICAL EDUCATION PROVIDED BY ASSOCIATE TEACHERS IN THE PUBLIC SCHOOLS. Lynda E. Randall and Charles Imwold, Florida State University, Tallahassee, Florida.

The purpose of this study was to determine the effect of a training program on the amount of Academic Learning Time in Physical Education (ALT-PE) provided by associate teachers (interns). The subjects were 13 associate teachers who were completing a 15-week internship in public school physical education. A treatment group - control group experimental design was used to test the effect of the intervention, and a method of random selection was used in assigning subjects to groups. Subjects in the treatment group (n=6) participated in a two-hour seminar prior to initiating the internship. In addition, treatment-group subjects received directed information feedback and participated in goal setting relative to ALT-PE during their two regular supervisory visits. Subjects in the control group (n=7) did not participate in the seminar and received traditional supervisory feedback. A total of 50 classes (approximately four per subject) were observed for an average duration of 35 minutes, and the ALT-PE observation instrument developed by Siedentop, Tousignant, and Parker (1982) was used in the collection of data. Descriptive analysis of the data revealed that teachers in the treatment group produced greater amounts of ALT-PE ($\bar{X}$=38.6% of observed time) than teachers in the control group ($\bar{X}$=25.5% of observed time). A t-test demonstrated that these differences were statistically significant ($p<.05$). These findings have important implications for the implementation of theory into practice in the supervision of novice teachers. Critical teaching behaviors and competencies which are developed in undergraduate preparation programs may not be transferred to actual teaching practice without systematic monitoring and reinforcement during the transitional period.

Dr. Lynda E. Randall
Movement Science and Physical Educ.
118 Tully Gymnasium
Florida State University
Tallahassee, Florida 32306

Saturday, April 12
2:45-3:00 p.m.

OBSERVATION AND DESCRIPTION OF DYADIC INTERACTIONS BETWEEN TEACHERS AND SIXTH-GRADE CHILDREN.

Frances A. Strazzulla, Boston University.

This study investigated the dyadic interactions between teachers and children in terms of three variables: student sex, teacher sex, and student ability. It was the purpose to describe how male and female teachers differ in terms of their dyadic interactions and to determine if there was a difference in dyadic interactions between teachers and (1) male and female students and (2) ability grouped students. Four male and four female physical education teachers and 180 students participated in the study. Each student was administered the AAHPERD Basketball Skills Test to determine high and low ability groupings. The Dyadic Adaptation of CAFIAS (DAC) measured teacher-student interaction. Lessons were videotaped and recorded a total of 24 times. Chi-square analyses and analyses of variance revealed the following statistically significant findings: (1) Teachers interacted with male students more often than with female students and with high ability males more than with high ability females, low ability females and low ability males and (2) Female teachers had more dyadic interactions with students than did male teachers. Statistically significant findings were also obtained with respect to the DAC categories: (1) Male students were given more praise, directions, criticism, had more ideas accepted and gave more analytic and initiated responses than female students, (2) High ability male students were given more praise, directions, criticism, and gave more analytic responses than did high ability females and low ability students and (3) Female teachers gave both high and low ability grouped students more criticism, asked them more questions, and allowed for more student predictable and analytic responses than did male teachers. It may be concluded that male students receive preferential treatment by teachers with respect to teacher-student dyadic interactions. Furthermore, it may also be concluded that high ability females are least involved in the interactive process between teacher and student, with female teachers giving the least amount of attention to high ability female students.

Frances A. Strazzulla Ed.D.
Thurston Point Road
Gloucester, MA 01930

Saturday, April 12
3:00-3:15 p.m.

THE RELATIONSHIP OF SOMATOTYPE AND ISOKINETIC TORQUE TO LOWER EXTREMITY INJURIES IN FEMALE ATHLETES. Geraldine A. Greenlee and Kathleen A. Schniedwind, Illinois State University

The purpose of the study was to determine the degree to which pre-season somatotype determination and isokinetic torque evaluation of the knee and ankle joints could identify collegiate varsity female athletes who would incur injury to the lower extremities or back which would require treatment during the competitive season. Seventy six (76) athletes from four teams, basketball (14), softball (18), track and field (30), and volleyball (14), were evaluated at the beginning of their respective sports seasons. The Heath-Carter somatotype was computed and isokinetic measures were obtained using a Cybex II Isokinetic Dynamometer. Bilateral torques of the antagonistic muscle groups at the knee were obtained at 60^{o}, 180^{o}, 240^{o} and $300^{o}.s^{-1}$ and for the ankle at 60^{o} and $180^{o}.s^{-1}$. An injury log was kept for each sport team and the type, location and severity of each injury was recorded at the time of occurance. Forty (40) athletes completed the sports season without injury to the lower extremities or to the back. Data were first subjected to examination by ANOVA. The three somatotype components and the three significant isokinetic measures were then subjected to stepwise discriminant function analysis with group membership being determined by no injury-injury status. The results revealed a significant canonical correlation of .419, Wilks Lambda .825, $X^2(6) = 13.695$, $P = .033$. The order of entry and standardized discriminant function coefficients were: endomorphy (.203), mesomorphy (1.073), ectomorphy (.683), and the bilateral peak torque ratios at $180^{0}.s^{-1}$ for dorsal flexors (.380), flexors at knee (.403), and extensors at knee (.359). In the no injury (NI) group the left limb developed larger torques than the right for all muscle groups while the torques were greater in the right limb than the left for the injured (I) group. The injuries were concentrated in the somatotype classifications where endomorphy was higher than or equal to mesomorphy and larger than ectomorphy. In the classification analysis 82.5% of the NI and 61.1% of the I were classified correctly with an overall correct classification of 72.37%. The results indicate that the Heath-Carter somatotype combined with bilateral isokinetic deficits can assist in identifying female athletes with a low risk of injury to the lower extremities or back during a competitive sports season.

Geraldine A. Greenlee
Department of Health, Physical
Education, Recreation and Dance
Illinois State University
Normal, Il 61761

Saturday, April 12
3:45-4:00 p.m.

RELATIONSHIPS AMONG SKINFOLD MEASURES OF LOWER TORSO AND ABDOMINAL FAT IN ATHLETES. Wayne E. Sinning and Anthony C. Hackney. Applied Physiology Research Laboratory, Kent State University, Kent, OH 44242.

Equations for estimating body fat from skinfolds (SF) may employ SF measures of abdominal fat taken at different sites. In some studies where such equations have been cross-validated, the investigators have not used the exact measurement sites used in the study where the equations were developed. Sometimes it is difficult to determine the exact site from the description. It was the purpose of this investigation to use data from studies on 79 female athletes and 265 male athletes to study the interrelationships among SF measures of lower torso and abdominal fat to determine the acceptability of using them interchangeably. Sites included were suprailiac vertical (SIv - vertical fold superior to the iliac crest); suprailiac oblique (SIo - oblique fold superior to the iliac crest); suprailiac anterior (SIa - oblique fold on the abdominal wall about 1 cm anterior and 2 cm superior to the anterior superior iliac spine), and juxta-umbilicus (JA - a vertical fold beside the umbilicus). All four skinfolds were available for females, but only SIo, SIa and JA were available for males. Mean values (±SD) for females were SIv, 15.5±6.4 mm; SIo, 13.8±5.9 mm; SIa, 11.2±4.3 mm; and JA, 14.5±5.1 mm. Except for SIo and JA, all t-ratio comparisons were significant ($p<.05$). Between measure correlations were SIv-SIo, .91; SIv-SIa, .85; SIo-JA, .82; SIo-SIa, .84; SIo-JA, .74; SIa-JA, .80. Correlations with body density (BD) measured by underwater weighing were SIv, -.66; SIo, -.69; SIa, -.65; and JA, -.58. Mean values for males were SIo, 12.2±6.5 mm; SIa, 10.3±5.1 mm; and JA, 10.8±5.4 mm. All t-ratio comparisons were significant. Between measure correlations were SIo-SIa, .86; SIo-JA, .72; SIa-JA, .89. Correlations with BD were SIo, -.79; SIa, -.79; and JA, -.77. Findings suggest that all sites measure the same component of body composition, with very little error difference. Interchanging them in established equations used to estimate body fat from SFs, showed errors which were within the expected limits (i.e., < 3.3% as determined by Lohman, Human Biology, 1981). It was concluded that interchanging these measures in regression equations would produce an error within that of the method, but this error would be directional rather than random.

Wayne E. Sinning
Applied Physiology Research Laboratory
School of PERD
Kent State University
Kent, OH 44242

Saturday, April 12
4:00-4:15 p.m.

THE USE OF THE ELECTRICAL IMPEDANCE METHOD AS AN ACCURATE ASSESSMENT OF BODY COMPOSITION.

Robert N. Girandola, University of Southern California; Mario Pace, University of Southern California.

The purpose of the study was to evaluate the accuracy and validity of the electrical impedance(EI)method for assessing body composition in college age males and females. A series of experiments were designed to: (1) determine the validity of the EI method compared to hydrostatic weighing (HW), (2) determine the accuracy and sensitivity of the EI method by altering hydration level of tested subjects. In the first experiment 193 college-age subjects (119 males; 74 females) were tested for body composition by traditional HW technique and by the EI method. Average percent fat for the subjects was 15.5 and 16.1 for the HW and EI methods, respectively. Despite the similarity in the mean values the validity coefficient was $r=0.84$ and the standard error of estimate was 3.1% fat. The absolute mean difference was 3.3% fat. Considering that the average mean value for the group was approximately 16% fat this variability amounts to almost 20% of the mean. Presently, several anthropometric techniques have a higher validity then the EI technique. The EI technique measures total body water (TBW) and then predicts lean body weight. To evaluate the accuracy and sensitivity of the method 15 subjects altered their level of hydration by dehydration or hyperhydration. Nine subjects dehydrated in a sauna (water loss=0.67 L) and were measured pre- and post by both EI and HW. The HW method was basically unchanged after dehydration however, there was a 1.0% decrease in % fat measured by EI ($P<.05$). Basically the EI method estimated a greater proportion of TBW after dehydration. Six subjects drank an average of 1.0 L of fluid and were again pre-post tested by HW and EI methods. There were no changes measured by HW but the EI method revealed a significant ($P<.05$) 1.7 % increase in predicted fat. The EI method estimated a lower proportion of TBW after hyperhydration. The EI technique is highly sensitive to changes in hydration level of the subject and appears to measure these changes in the opposite direction.

Dr. Robert N. Girandola
Department of Physical Education
University of Southern California
Los Angeles, CA. 90089-0652

Saturday, April 12
4:15-4:30 p.m.

WHOLE BODY ELECTRICAL RESISTANCE AS A PREDICTOR OF LEAN BODY WEIGHT: A VALIDITY AND RELIABILITY STUDY.

Charles Marks, Komei Hattori, Victor L. Katch, M. Daniel Becque, Douglas L. Ballor. The University of Michigan.

Fifty-five male and female subjects were studied to test the validity and reliability of whole body electrical resistance (WBR) as a predictor of lean body weight (LBW). Selected characteristics (Mean ± SD) of the subjects are as follows.

SEX	N	AGE (YRS)	WEIGHT (KG)	HEIGHT (CM)	BODY FAT (%)
F	27	24 ± 5	57.00 ± 7.00	165.0 ± 6.4	20.1 ± 4.7
M	28	24 ± 5	74.59 ± 9.87	178.4 ± 6.6	12.1 ± 5.3

Hydrostatic weighing (HW) was the criterion measurement for LBW assessment, with residual lung volume determined by the oxygen dilution method. LBW analysis by WBR was determined employing the RJL bio-electrical impedance system. Test-retest reliability for WBR (5 min between tests) is r= 0.99. Reliability (N= 13) across a 5 day period is r= 0.98. There were no significant ($p<.05$) mean differences between the WBR and HW even when stratified by sex. The correlation and standard error (n=55) between WBR and HW for LBW is r= 0.94 , ± 4.34 kg. The correlation and standard error between WBR and HW by sex is; females : r= 0.50, ± 4.10 kg and males : r= 0.91, ± 2.85 kg. Converting the standard error to a range of error in %fat using the average LBW (females = 45.54 kg; males = 65.41 kg), the range for females is calculated to be 12.9 to 27.3 fat percentage points, and for males, 8.3 to 15.9 fat percentage points. It is concluded that the WBR is reliable and ranks individuals fairly well. However, due to the large standard error individual assesment of LBW and %fat is subject to substantial error.

Charles Marks
Department of Kinesiology
University of Michigan
Ann Arbor, MI 48109

Saturday, April 12
4:30-4:45 p.m.

PROBLEMS IN ESTIMATING RESIDUAL VOLUME OF FEMALE ATHLETES FOR BODY DENSITOMETRY. Kathleen D. Little, Wayne E. Sinning and Anthony C. Hackney, Kent State University, Kent, OH 44242.

The purpose was to cross-validate residual volume (RV) prediction equations employed in body densitometry and to attempt to develop a new equation which might estimate RV more accurately in female athletes. Equations derived by Bergland et al. (*Acta Med. Scand.* 173:185, 1963), Goldman and Becklake (*Am. Rev. Tuber.* 79:457, 1959), Grimby and Sodenhalen (*Acta Med. Scand.* 173: 199, 1963), Needham et al. (*Thorax* 9:313, 1954), and Wilmore (*Med. Sci. Sports* 1: 87, 1969) were cross-validated on 82 female college athletes against RV measured by helium dilution. Statistical analyses included comparison of predicted and measured RV ($\bar{X}$±SD=1036±29 ml) and regression analysis. Means ($\bar{X}$) ± standard deviations (SD), *t*-ratios, correlations (r), standard errors of estimate (SEE), and total errors (E) for the equations were (*, $p \leq 0.05$):

Equation (EQ)	$\bar{X}$ ± SD	t-ratio	r	SEE	E
1)Bergland et al.	1133±184	3.54*	0.44*	240	264
2)Goldman&Becklake	1549±220	17.91*	0.44*	240	574
3)Grimby&Sodenhalen	1247±201	7.54*	0.44*	240	327
4)Needham et al.	1518± 13	16.44*	0.07	267	549
5)Wilmore	1047±126	0.33	0.15	265	276

None of the equations met statistical criteria for accurate prediction of RV. When estimated RVs were used to compute percent body fat (%F) in place of the measured RV (%F=20.2), EQ1, EQ3 and EQ5 were within the error of the method (19.5, 18.6 and 20.1%, respectively) while EQ2 and EQ4 greatly underestimated %F (16.3 and 16.4%, respectively). Stepwise regression analysis was used to derive a new equation from anthropometric variables selected by factor analysis to minimize shared variance [RV= 19.06 x Height - 12.96 x Abdominal Circumference - 1133 (R=0.50, SEE=233)]. RVs estimated from the equations which were cross-validated, as well as from the newly derived equation, did not correlate highly (*r*s <0.60) with the measured RV. Factor analysis and zero-order correlations illustrate the problem of estimating RV from anthropometric measures in that RV did not load heavily on any derived factor, nor did any *r* exceed .44 (stature) in a matrix of 62 anthropometric measures and vital capacity. However, due to the relatively small contribution of the RV to total body volume, small but significant differences between estimated and measured RV may not greatly affect the computed %F.

Kathleen D. Little
Applied Physiology Research Laboratory
School of PERD
Kent State University
Kent, OH 44242

Saturday, April 12
4:45-5:00 p.m.

BELIEFS AND STAGES IN EXERCISE ADOPTION.

Robert J. Sonstroem, University of Rhode Island, Linda Amaral, East Weymouth Public Schools, Massachusetts

The purpose of this research was to test the association of belief statements with self-reports of physical activity over the previous four years. Four consecutive stages of exercise adoption and adherence were proposed following the model employed by Prochaska and DiClimente for smoking cessation. 167 males aged 30^+, responded to 69 belief statements (Fishbein protocol) and were classified via questionnaire as non-exercisers (NE), contemplators (CO) (thinking of beginning a program), recruits (RE) (involved in exercise 3/wk.<2 yr.), and maintainers (MA) (involved in exercise 3/wk. >2 yr.). One major discriminant function (9 belief items) produced a canonical $r = .75$ with stages of exercise adoption and correctly classified 67.9% of subjects. Classification accuracy was consistent across the 4 stages (28.3% to 46.3% above baseline percentages). Group centroids differed significantly from each other and were ordered identical to the proposed sequence of stages. When 48 dropouts (DO) were added to the subject pool, a new disciminant function resulted in a decreased overall classification accuracy (50.9%). Surprisingly, the DO centroid lay between those of CO ($p>.11$) and RE ($p<.001$). Further inspection revealed that 37 of the DO were again contemplating exercise. Classifying these 37 as CO in a new analysis improved the overall accuracy to 60.3% and placed the DO centroid between those of NE ($p<.02$) and CO ($p<.001$). It was concluded that stages of exercise adoption are best studied as a cyclic process with many "dropouts" reentering activity and perhaps progressing to an advanced stage. These people manifest more favorable beliefs about exercise than contemplators without previous exercise experience. Beliefs were shown to predict exercise adoption stages with a high degree of accuracy.

Robert J. Sonstroem
106 Tootell Center
University of Rhode Island
Kingston, RI 02881

Sunday, April 13
9:00-9:15 a.m.

EDUCATIONAL STRATEGIES FOR IMPROVING LONG TERM ADHERENCE TO FITNESS ACTIVITY.

Leslie T. Lambert, University of Wyoming

The development and examination of a fitness program which emphasized long term commitment and improvement in fitness performance was the specific focus of this study. This program was based upon a theoretical model which identified factors that affect initial involvement and long term adherence to fitness exercise. Subjects for this study were 69 undergraduate professional physical education students who were randomly assigned to experimental and control groups. Data were collected using pre and post measures of knowledge, confidence, commitment to activity, and fitness. In order to address long term commitment and fitness performance follow-up data were collected at three and six month intervals. The experimental group experienced fitness concepts, fitness activity, and selected adherence strategies based upon the theoretical model. The control group experienced a typical fitness program based upon fitness concepts and fitness activity. Three way and repeated measures analyses of covariance were used to compare group performance. An alpha level of .05 was selected. Effect sizes were computed on all statistically significant results. At the end of the course, it was determined that the experimental group was superior to the control group relative to measures of knowledge, confidence, commitment, and abdominal strength/endurance. From a longitudinal perspective, the experimental group was clearly superior to the control group with respect to commitment and actual fitness performance at both three and six month intervals. Pearson product-movement correlations were used to determine if there were relationships among the variables measured. Cognitive and affective variables were correlated with one another. To predict long term commitment to fitness activity, multiple regression, and step-wise multiple regression were used. When measures of knowledge, confidence, and fitness obtained at the end of the course were used to predict the three month commitment to activity criterion variable, confidence explained the greatest proportion of the variance. It was therefore considered to be the best indicator of commitment to fitness activity.

Leslie T. Lambert
School of Physical & Health Education
University of Wyoming
Laramie, Wyoming 82071

Sunday, April 13
9:15-9:30 a.m.

INITIAL DEVELOPMENT OF A MULTIDIMENSIONAL, SPORT-SPECIFIC COMPETITIVENESS INVENTORY. Diane L. Gill and Thomas E. Deeter, The University of Iowa.

A multidimensional inventory was developed to assess competitiveness as the desire to approach and strive for success in sport situations. An initial pool of 58 items representing competitiveness and achievement orientation in sport was circulated among five raters who rated each item for content and clarity. The resulting 32-item inventory was administered in two separate studies to samples of male and female students enrolled in competitive and noncompetitive skills classes ($n = 237$ in Study 1; $n = 218$ in Study 2). Factor analyses, described in an accompanying paper, revealed consistent three-factor solutions across studies, with the factors representing competitiveness (e.g., enjoyment of competition, striving for success in competition), win orientation (e.g., striving to win in competition), and personal goal orientation (e.g., striving to reach personal standards in competition). Alpha coefficients and item-to-total correlations revealed high internal consistency for each factor. Furthermore, students in competitive classes had significantly higher competitiveness scores than students in noncompetitive skills classes, providing initial support for the validity of the inventory. The factor stability, internal consistency and initial validity evidence suggest that the Competitiveness Inventory can be a valuable instrument for assessing competitiveness as a multidimensional, sport-specific individual difference variable.

Diane L. Gill
E116 Field House
University of Iowa
Iowa City, IA 52242

Sunday, April 13
9:30-9:45 a.m.

DETERMINING FACTOR STRUCTURE IN A MULTIDIMENSIONAL INVENTORY.

Thomas E. Deeter and Diane L. Gill, The University of Iowa.

A two-step procedure is described and used to revise a multidimensional inventory in its developmental stages. First, the latent factors influencing the observed variables on the inventory are determined and justified using the following five methods: Kaiser's criterion, root staring, examination of difference values, examination of root mean square off-diagonal residuals and alpha coefficients. The second step, determining the factor pattern, consists of examining selected factor solutions for stability and simplicity of variables. Each of these methods is considered separately, and it is suggested that the conglomerate of methods be used in the initial stages of questionnaire development, with the final decision based on theoretical significance and parsimony. These procedures are illustrated with data from the initial form of the Competitiveness Inventory, a self-report, sport-specific achievement orientation inventory. The inventory was administered to physical education skills classes at the University of Iowa during Spring semester 1984 (n = 237), and again during Spring semester 1985 (n = 218). Independent exploratory factor analyses were performed on each sample with the use of SAS and SPSS-X. Results revealed a stable three-factor pattern across samples, and suggested that 25 of the original 32 items be retained for the revised version of the Competitiveness Inventory.

Thomas E. Deeter
E102 Field House
University of Iowa
Iowa City, IA 52242

Sunday, April 13
9:45-10:00 a.m.

Identification and Prediction of Stressors in Youth Soccer Participants. John M. Silva III Charles J. Hardy and R. Kelly Crace. University of North Carolina-Chapel Hill, N.C. 27514

The purpose of this study was to assess perceived sources of stress among 294 youth soccer participants (M=138; F=156). Subjects ranged in age from 13-18 with 1 to 13 years of experience (M experience = 7.52). Subjects completed a psychological inventory which assesses the importance of 33 sources of stress. A response of 1 indicates a high level of stress and a response of 7 suggests no stress. Major sources of stress $(M<4.0)$ included: not performing well, performing up to one's ability, improving upon last performance, making mistakes, losing, coach's comments, championship meets, teammate's comments and physical appearance. Principal component factor analysis with varimax rotation revealed that the 33 sources of stress loaded on 4 factors which accounted for 43.62% of the total variance. The factors were interpreted as: (1) performance achievement (32.07%), (2) somatic concerns (29.19%), (3) social evaluation (23.04%), (4) external control/guilt (15.67%). Multiple regression analyses utilizing the factor scores as the criterion and age, gender, years of experience and lie scale scores as predictors revealed significant relationships for all four factors. The regression models suggest that: Females are more concerned than males about performance achievement stressors, $F\ (1,292) = 6.72$, $p < .01$, $R^2 = 2.25\%$; Somatic concerns appear to occasionally worry older, less experienced females with low lie scale scores, $F\ (4,289) = 7.53$, $p < .0001$, $R^2 = 9.44\%$. Some sources of social evaluation were moderately stressful (M=3.69). Younger athletes who scored lower on the lie scale were more concerned about social evaluation, $F\ (2,291) = 6.63$, $p < .001$, $R^2 = 4.36\%$. Guilt/external control was not a significant source of stress for the respondents (M=5.79), however, males demonstrated more concern than females about external control/guilt, $F\ (1,292) = 8.15$, $R^2 = 2.71\%$. Results of this study indicate that performance achievement is the most salient sources of stress for young soccer players. Somatic concerns and social evaluations were occasional sources of stress while concerns over external control and guilt did not create significant stress responses.

John M. Silva
Dept. of Physical Education
UNC
Chapel Hill, NC 27514

Sunday, April 13
10:00-10:15 a.m.

INFLUENCE OF ACUTE EXERCISE AND QUIET REST ON STATE ANXIETY AND BLOOD PRESSURE IN NORMOTENSIVE AND HYPERTENSIVE ADULT MALES.

J.S. Raglin and W.P. Morgan, University of Wisconsin-Madison.

The purpose of this investigation was to study the effects of quiet rest and aerobic exercise in their ability to alter anxiety and blood pressure. Blood pressure and State Anxiety (STAI) were assessed prior to and following the treatments. Systolic (SBP) and diastolic (DBP) blood pressure were also assessed at 5-min intervals during the rest session.

In the first investigation 15 normotensive Ss were assessed immediately following the treatments and 20-min, 1, 2, and 3-hr post-treatment. State anxiety decreased significantly ($P<.02$) following exercise, but the reduction following quiet rest was not significant ($P>.05$). Blood pressure was significantly reduced following both conditions. The exercise reduction in SBP ($P<.001$) persisted throughout the 3-hr follow-up, whereas the reduction in DBP remained significant for 2-hr post-exercise. SBP was also reduced significantly ($P<.001$) following quiet rest, but the reduction in DBP was not significant ($P>.05$). Also, the reductions in blood pressure associated with the rest condition persisted for less than 20-min.

A second experiment dealt with the influence of a warm shower on psychophysiologic change. Blood pressure and state anxiety of 15 normotensive Ss were assessed prior to and following a 5-min warm shower (38.5°C). The results revealed that the shower was associated with a significant reduction in state anxiety ($P<.01$). Blood pressure was also reduced but the decrement was not significant ($P>.05$).

The third experiment involved an evaluation of aerobic exercise and quiet rest in 15 pharmocologically-controlled hypertensive Ss. The results revealed that exercise and quiet rest were both associated with significant reductions in state anxiety ($P<.01$). SBP was significantly reduced following exercise ($P<.01$) and rest ($P<.001$). In the case of rest the SBP was transient and only occurred during the session. Neither condition was associated with a reduction in DBP and it is hypothesized that the low baseline resulting from pharmacological treatment prevented any further reductions.

On the basis of this research it is concluded that exercise and quiet rest have similar effects on state anxiety and blood pressure, but the effects are sustained for a longer period following exercise.

John S. Raglin
Department of Physical Education
University of Wisconsin
2000 Observatory Drive
Madison, WI 53706

Sunday, April 13
10:45-12:00 p.m.

PHYSIOLOGICAL AND PSYCHOLOGICAL RESPONSES TO PREFERRED AUDITORY STIMULATION DURING SUBMAXIMAL EXERCISE. Susan C. Stohrer, Gary A. Sforzo, Patricia A. Frye, Ithaca College.

The purpose of this study was to investigate physiological (heart rate [HR], oxygen consumption (VO_2), ventilatory frequency [Vf], endurance time [ET]) and psychological (perceived exertion [PE]) responses to preferred auditory stimulation during submaximal exercise. Nineteen aerobically trained individuals of two age groups (10 college students and 9 adults over 35 years of age) were each given a graded exercise test to determine their maximum oxygen consumption (VO_2 max) prior to the random assignment of music and no music trials. For the music trial, subjects listened through portable cassette/headphones to a tape from the music style category (rock, easy listening, classical, and country) they selected. The exercise trials were performed at 75% VO_2 max, until volitional fatigue. Data were recorded at two time intervals identified as begin-exercise (BE) and end-exercise (EE). A 2 x 2 x 2 (Age by Time by Music) multivariate analysis of variance (MANOVA) revealed no significant interactions. According to the analyses, music had no effect upon variables examined and there was little difference between the age groups studied. However, though no statistically significant findings were observed, the means for the college-aged group revealed that college students tended to run longer, with lower heart rates, when music accompanied exercise. The large variability in training status of the subjects within each group (producing a great variability in ET and possibly submaximal exercise HR) may have obscured the small but consistent changes in HR (8 of 10 subjects) and exercise endurance (7 of 10 subjects) experienced during the music trial. Replication of this study using more homogeneous subjects may lead to the finding that music may have the ability to increase endurance performance and lower exercise HR for college-aged individuals.

Susan C. Stohrer
Exercise Physiology Laboratory
Department of Physical Education
Ithaca College
Ithaca, NY 14850

Sunday, April 13
11:00-11:15 a.m.

THE EFFECT OF AEROBIC EXERCISE PARTICIPATION ON THE SELF-CONCEPT OF SEDENTARY WOMEN. Sheryl L. Tudeen, Patricia J. McSwegin, Loren D. Tompkins, Emporia State University, Emporia, Kansas.

The purpose of this study was to determine what effect participation in an aerobic exercise program had on the self-concept of sedentary women. Twenty female volunteers who had not engaged in regular (two times a week) physical activity in six months prior to the experiment served as subjects. Twelve females participated in the researcher's experimental eight-week aerobic exercise program. The control group was comprised of eight females who did not change their sedentary lifestyle habits. All subjects were pre- and post-tested on the Tennessee Self-Concept Scale and the Kasch Submaximal Bench Stepping Test for Healthy Middle-Aged Adults. Females participating in the aerobic exercise program were also pre- and post-tested on the YMCA bicycle ergometer test. The differences in each subject's pre- and post-test scores on the Tennessee Self-Concept Scale were calculated and the five sub-scores of self-criticism, self-satisfaction, physical self, personal self and social self were used for analysis. The step test scores were used to evaluate changes in aerobic fitness. Analysis of covariance was then performed, holding any fitness effects constant, while determining whether differences in self-concept mean changes between the experimental group and the control group existed at the .05 level of significance. Although self-concept differences between the two groups were found to exist at the .082 level of probability, this did not meet the earlier established level of .05 needed for statistical significance. However, based on the consistency of self-concept differences between the two groups on all sub-scores, the .08 level that was obtained and the positive written and verbal feedback by the experimental group regarding self, this study was found to have meaning on a substantive level.

Patricia J. McSwegin, Ph.D.
Division HPER&A
Emporia State University
Emporia, Kansas 66801

Sunday, April 13
11:15-11:30 a.m.

FACTORS RELATING TO PARTICIPATION IN ATHLETICS AND EXPRESSED DESIRE TO PARTICIPATE IN PHYSICAL ACTIVITIES AMONG ADOLESCENTS.

Mary L. Young, University of Minnesota

While a number of factors have been reported in the literature which proport to relate to participation in athletics and physical activity, these have generally be considered in isolated clusters and many have not included adolescents. The purpose of this study was to examine the relative influence of: average grade received in physical education, school; physical performance items - sit-ups and mile run; birth order; number of older siblings; height; and self-perception items - estimation of physical fitness level, ability in sport and physical activity, academic ability; skill in social relationships; perception of parents estimate of my athletic ability; belief in importance of personally being good in sport and physical activity; acceptance of weight; self-esteem; and locus of control to participation in athletics and expressed desire to participate in physical activities. Grade 10 males (128) and females (101) from a predominantely white, suburban high school were given (1) a background information form and a questionnaire which included the demographic data, questions pertaining to self-perception items and desire to participate in physical activities; (2) Tennessee Self Concept Scale, (3) Nowicki-Strickland Locus of Control Scale; and (4) the physical performance items. Stepwise multiple linear regression results are all significant at the .0005 level. F-to-enter values are given after each predictor variable. For participation in athletics measured by number of sports currently participated in, the model for females included: physical education grade (54.97), perception of parent's estimate of my athletic ability (17.87), acceptance of weight (7.81), and estimate of fitness level (4.66), accounting for 52% of the variance. For males, the model included: sit-ups (63.28), physical education grade (6.53), and estimate of skill in social relations (4.35), accounting for 39% of the variance. For expressed desire to participate in physical activities, the model for females included: attitude toward physical education (22.91), and perception of parent's estimate of my athletic ability (3.18), accounting for 21% of the variance. For males the model included: attitude toward physical education (24.18), self-esteem (5.19), and number of older sisters (4.21), accounting for 22% of the variance. Discriminant analysis for whether or not the individual was currently participating in athletics allowed a significantly better than chance classification for both sexes (for females, a correct classification of 78% with 7 items or 77% with 4 of the self-perception items; for males, 75% with 9 items). Average grade in physical education was the most important predictor for both sexes with perception of parent's estimate of my athletic ability and estimate of skill in social relationships next for females and estimate of ability in sport and physical activity and average school grade next in importance for males.

Mary L. Young
Division of Physical Education, 224 Cooke Hall
University of Minnesota
Minneapolis, MN 55455

Sunday, April 13
11:30-11:45 a.m.

A META-ANALYSIS OF THE PERCEIVED EXERTION LITERATURE.

Carrie R. Fitzgerald, Deborah L. Feltz, and Betsy J. Becker,
Michigan State University.

Perceived exertion is an individual's perceptual interpretation of the intensity of physical exercise. How modifying variables such as exercise type or subject age affect the correlation between ratings of perceived exertion (RPE) and physiological measures is still uncertain. The purpose of this study was to explore this question through a meta-analysis of the perceived exertion literature. From individual studies, correlation coefficients were established between RPE and physiological measures using the Fisher Z-transformation. The physiological measures reviewed were heart rate (HR), blood lactate, minute ventilation, respiration rate, and oxygen uptake. Within studies, the correlations were calculated for subject groups according to the following modifying variables: subject age, gender, and fitness level; exercise type; and exercise protocol. A test of homogeneity of all Z-scores determined whether the overall averaged Z-score was representative of all the relationships between RPE and various physiological measures. If the Z-scores were found to be heterogeneous (i.e., the test was significant), stepdown ANOVA-like analyses were used to determine the modifying characteristics. Results indicated that the overall average correlation was $r = .46$ and the homogeneity test for the Z-scores was significant. ANOVA-like analyses indicated that HR studies modified the relationship. The homogeneity test for correlations between RPE and HR ($\underline{M} = .68$) was also significant. ANOVA-like analyses indicated subject gender and exercise type significantly modified this relationship. Studies employing female subjects using a bike ergonometer were found to be homogeneous, but studies employing male subjects using bike or treadmill exercise modalities were heterogeneous. This finding indicated there were additional unexamined variables that had an influence on the strength of the RPE-HR relationship. The homogeneity test was not significant for relationships between RPE and blood lactate, minute ventilation rate, respiration rate, and oxygen uptake.

Carrie R. Fitzgerald
School of Health, Counseling, Performance
Michigan State University
East Lansing, MI 48824

Sunday, April 13
11:45-12:00 a.m.

ADAPTABILITY IN MULTIJOINT MOTION: A COMPARATIVE STUDY.

Dr. Anne Beuter, University of Quebec, Montreal and Dr. Jo Cowden, University of New Orleans.

The purpose of this comparative investigation was to examine the patterns of adaptation due to limited action of the plantar flexors (push off) in various multisegmented motions of two subjects. One subject was a nonhandicapped adult female and the second subject was an adult male with a partial transverse tarsal deficiency. Both subjects were analyzed twice while they walked, jumped, stepped, and ran with and without visual feedback. A total of 32 behaviors were recorded using a Selspot Motion Analysis System. Light emitting diodes (LEDs) were secured on the ankle, knee, hip, and shoulder joints and connected to a control unit worn on a belt, interfaced with Selcom Administration Unit and a PDP 11/23. The LEDs were tracked at 277 hz from 2 infrared cameras. The kinematic relationships (displacement and velocity) between the moving joints were generated using a DEC graphics printer. Orbital plots and phase planes were used to characterize the adaptation patterns of the "footless" subject. Here, orbital plots provide simultaneous description of angular and temporal information in two joints. Phase planes typically use the magnitude of a variable against its rate of change (displacement/velocity) to represent the state variables of a system. We observed that in general the synergies are disturbed. In dealing with limited plantar flexion the "footless" subject adapts in the following way: oscillations increase both at the hip and knee, landing is initiated sooner, amplitude is decreased, the foot path in the air is modified, and finally the limit cycles become unstable at the hip and knee. There were no obvious qualitative differences between the visual and nonvisual conditions. We addressed the question of whether these patterns of adaptation correspond to "new" patterns or "extreme" adaptation of the same pattern. Based on results from modeling multijoint motion (Beuter, Flashner, and Arabyan, Biol Cybernetics, 1985) we conclude that the "footless" subject displays extreme patterns of adaptation. We examined the practical significance of these results for the design and implementation of appropriate rehabilitation programs.

Dr. Anne Beuter
University of Quebec, Montreal
Department of Kinanthropologie
CP 8888 Suc A
Montreal, P.Q. Canada H3C 3P8

Sunday, April 13
1:00-1:15 p.m.

A COMPARISON OF BIOMECHANICAL CHARACTERISTICS BASED ON LIMB INVOLVEMENT OF ELITE CEREBRAL PALSIED ATHLETES PERFORMING A SPRINT RUN.

Carol J. Pope, Texas Woman's University.

The purpose of the study was to descriptively compare the temporal and kinematic characteristics of the more-involved and non- or less-involved body segment parameters of elite cerebral palsied (CP) athletes performing a sprint run. Seventeen international level CP athletes (Class VI, VII, and VIII) who were finalists or semifinalists in their events were filmed at the 1984 International Games for the Disabled in New York. Two Bell & Howell high speed motion picture cameras operating at 50 & 54 frames per second were bilaterally positioned 13.72 m from the Ss. Data reduction was performed using a 1224 Numonics digitizer, Apple II Plus microcomputer, monitor, graphics printer, and the BIOMEK computer program. Ss were arranged into 3 groups according to side of greatest involvement (right, left, or equal involvement of both sides). To descriptively determine what similarities and differences existed, means and standard deviations were calculated for each group on linear, temporal, and angular variables. Components examined included step, support, and recovery times, vertical displacements of the hip, knee, ankle, shoulder, and elbow joints, and angles of takeoff and touchdown of the total body center of gravity (COG). Patterns emerged among the dominantly involved (DI) Ss (those Ss predominantly involved on either the right or left side) on (a) vertical displacement, (b) support time, (c) recovery time, (d) hip, knee, ankle, and shoulder angular displacements, and (e) angle of touchdown. Equally involved (EI) Ss displayed lower values for step velocity, length, and vertical displacement than did DI Ss. EI Ss spent more time in support and less time in recovery than did the DI Ss. EI Ss demonstrated more symmetrical angular displacements between right and left sides than DI Ss at the hip, knee, ankle, and shoulder joints. EI Ss displayed a smaller angle of takeoff than did the DI Ss, indicating that the COG was farther forward for the EI Ss. Within the limitations of the study, it was concluded based on descriptive information that elite Class VI, VII, and VIII cerebral palsied athletes display distinguishing biomechanical characteristics between the more-involved and non- or less-involved sides during a sprint run.

Carol J. Pope
Department of Physical Education
Texas Woman's University
Denton, TX 76204

Sunday, April 13
1:15-1:30 p.m.

PERFORMANCE OF BASIC MOTOR LEARNING TASKS BY MEDICATED AND NONMEDICATED HYPERACTIVE EMOTIONALLY HANDICAPPED CHILDREN AND NORMAL CHILDREN.

Robert D. Hefley, Clemson University; Dean R. Gorman, University of Arkansas.

The purpose of this study was to investigate the performance of three specific child groups comparing hyperactive emotionally handicapped (EH) using prescribed stimulant medication (Ritalin), hyperactive EH not using medication and normal children on eight motor learning variables. These variables included: visual reaction time; visual movement time; visual response time; auditory reaction time; auditory movement time; auditory response time; and two eye-hand tracking skill tests. The subjects drawn for the study were all males, eight to eleven years of age. These boys represented three groups which were: fifteen normal boys; fifteen hyperactive EH nonmedicated boys; and nine hyperactive EH medicated boys. Both visual and auditory reaction time, movement time, and response time were measured by the Lafayette Reaction/Timer. Eye-hand coordination was measured on both a circle and triangle pattern by a photoelectric rotary pursuit. All subjects received ten practice trials followed by ten actual testing trials on each of the motor variables. Intergroup comparisons using a one-way analysis of variance followed by the post hoc Duncan's New Multiple Range Test were used to analyze the data. These tests revealed no significant differences between normal and nonmedicated hyperactive EH boys on the eight motor variables with the exception of tracking the triangle pattern on the rotary pursuit. The triangle pattern proved more difficult for the nonmedicated group whose time on target was significantly less than the normal group. Also, with the exception of movement time to a visual stimulus, the medicated group of hyperactive boys' scores were significantly slower on all other motor variables when compared to the other groups. These results indicate normal and hyperactive EH boys not using prescription medication have similar abilities when compared on these specific motor learning skills. Results also imply that the drug Ritalin, a commonly used drug to control hyperactivity, will have a negative effect, slowing down a childs' visual and auditory reaction time, as well as hindering eye-hand coordination.

Robert D. Hefley
College of Education
Clemson University
Clemson, SC 29631

Sunday, April 13
1:30-1:45 p.m.

RHYTHMIC TAPPING RESPONSE TO VISUAL AND VIBROTACTILE STIMULI.

Wendell Liemohn, Harry Hitchcock, Susan Shepherd, University of Tennessee, Knoxville.

Little research has been conducted in the hearing impaired relative to rhythmicity or its development; however, (a) timing and temporal awareness are often deficient in this population and (b) rhythmic-timing skill could broaden employment opportunities since it is essential to many assembly-line-type tasks. The purpose of this investigation was to compare rhythmic tapping response to visual and vibrotactile stimuli; the subjects were 43 children enrolled in the 5th and 6th grades at Tennessee School for the Deaf. The test equipment included an AIM 65 microcomputer programmed to generate the stimuli and score the responses. Rhythmicity performance was defined as the subject's ability to alternately tap two microswitches both (a) with and (b) following the stimuli presentation. Each stimulus modality was presented at 750 msec. intervals. The visual stimulus was a 2-cm. square flashing light 56 cm. in front of the subject; the vibrotactile stimulus was a Suvag VIBAR strapped just above the subject's right lateral malleolus. Stimuli modalities were presented in counter-balanced order; subjects had three trials for each modality. Each trial included a 6-tap warmup; all scores were based on the mean of the 8 interval values measured under each condition occurring during each trial. Intraclass correlation coefficients for trial to trial consistency ranged from .73 - .88 for the four modality/stimulus conditions. Rhythmicity performances were significantly better with and following the vibrotactile stimulus than they were for with and following the visual stimulus (P's = .0005 and .0009). The hearing impaired are usually considered as being visually orientated; this research supports consideration of the use of vibrotactile stimuli in training and work environments.

This study was a part of an investigation funded by the Office of Special Education and Rehabilitative Services, Department of Education (Project No. G008300016).

Wendell Liemohn
University of Tennessee, Knoxville
1914 Andy Holt Avenue
Knoxville, TN 37996-2700

Sunday, April 13
1:45-2:00 p.m.

TRAINING SELECTED FITNESS AND HYGIENE SKILLS AND THE RELATIONSHIP TO ADAPTIVE BEHAVIOR IN MENTALLY RETARDED INDIVIDUALS. Jeffrey McCubbin, Paul Jansma, Sue Combs, James Decker, Walter Ersing, Roslyn Jackson, Susan Long-Wilson; The Ohio State University.

As part of a three year field initiated research project (Project TRANSITION), the effects of training selected psychomotor skills and the relationship to adaptive behavior was studied. The psychomotor skills trained were five health-related physical fitness skills and five personal hygiene skills. The subjects (N=71) were moderately, severely and profoundly retarded individuals residing in a state-operated developmental center. Subjects were randomly assigned to one of four experimental groups and participated in a 14 week training program. To test the effects of the training, valid and reliable curriculum embedded tests developed for the project were used. The Adaptive Behavior Scale (Nihira, Foster, Shellhaas & Leland, 1974) was used to measure changes in adaptive behavior. Results of the physical fitness testing and personal hygiene testing using separate multivariate analysis of variance yielded significant group differences in both areas. Subsequent univariate analysis in each area indicated that in four of the five fitness skills, and four of the five hygiene skills, significant group differences were found. No significant differences were found in adaptive behavior. The data indicate that the developed curriculum can improve the performance of various physical fitness and personal hygiene skills in institutionalized subjects. The findings will be used to assist developmental centers, intermediate care facilities and educational facilities in developing physical fitness and personal hygiene programs for moderately, severely and profoundly retarded individuals.

Jeffrey A. McCubbin
Department of Health, Physical
Education and Recreation
The Ohio State University
Columbus, Ohio 43210

Sunday, April 13
2:00- 2:15 p.m.

A SHORT FORM OF THREE COMPONENT ALCOHOL ATTITUDE SCALE.

Mohammad R. Torabi, Indiana University; C. Harold Veenker, Purdue University

A three component alcohol attitude scale for college students composed of 54 Likert type items was reduced in length to produce a short form comprised of 12 items. Stepwise discriminant analysis of data identified those items most powerful as discriminators between drinkers and nondrinkers in their attitude toward drinking behaviors. The short form of 12 items was cross-validated by administration to 1000 subjects enrolled in four major Midwest universities. Data were statistically analyzed to test four hypotheses concerning the performance and validity of the short form. Results demonstrated highly significant levels of internal consistency and discriminating power of items and the total scale. Results of factor analysis of the data identified two factors in the underlying factor structure of the scale. The short form of the attitude scale was found to be a valid and highly reliable instrument for appropriate use as an alternative to the longer alcohol attitude scale from which it was derived.

Mohammad R. Torabi
Department of Applied Health Science
HPER 116E
Indiana University
Bloomington, IN 47405

Thursday, April 10
10:15-11:45 a.m.

AN EVALUATION OF AN ACTIVATED ALCOHOL EDUCATION COURSE.

William M. London, Kent State University; R. Daniel Duquette, University of Wisconsin - LaCrosse

The purpose of this study was to determine the effects of a course on "Alcohol and Behavior" on selected behaviors of alcohol abuse by university students. The course was based on Dennison's Activated Health Education principle of including experiential, cognitive and affective components. Students enrolled in a course on "Drugs and Health," devoted primarily to drugs other than alcohol, served as the control group. The two courses were offered as undergraduate electives for three semester hours at the same large, eastern university. Data were collected by administering a questionnaire to each class pretest-posttest style. The questionnaire included demographic items, a drinking severity subscale, an automobile related disruptive behavior subscale, and a non-automobile related disruptive behavior subscale. A single factor multivariate analysis of covariance with posttest subscale scores as the dependent variables and pretest subscale scores as the covariates was performed. The results indicated decreased alcohol abuse in both classes from pretest to posttest. However, posttest scores adjusted for pretest scores did not differ between classes. Therefore, it was concluded that the Alcohol class was no more effective in reducing alcohol abuse than was the Drug class. This finding conflicts with previous evaluations of activated alcohol education.

William M. London
316 White Hall
Kent State University
Kent, OH 44242

Thursday, April 10
10:15-11:45 a.m.

THE RELATIONSHIPS AMONG ATTITUDINAL, DEMOGRAPHIC, BEHAVIORAL, AND SOCIOCULTURAL VARIABLES AND THE SELF-REPORTED DRUG USE BEHAVIORS OF SCHOOL-BASED ADOLESCENTS.

Cynthia A. Wolford, Kent State University; James M. Eddy, The Pennsylvania State University

This study evaluated the relationships among various attitudinal, demographic, and behavioral variables with regard to the self-reported drug use of adolescents. The subjects in this investigation comprised a large representative sample of males and females ranging in age from 12 to 19 years, who were enrolled in either a Catholic, rural, small-town, suburban, or urban school district. The data were analyzed using a multiple-correlation regression protocol incorporating the self-reported use of cigarettes, beer, wine, liquior, marijuana, inhalents, PCP, depressants, hallucinogens, and stimulants as the dependent variables. The independent variables under consideration included: sex, grade level, grade average, feelings held about teachers and classmates, the behavioral intention to use drugs, and the time spent in academic, sport, and extra-curricular activities. The nature of the school attended by the subjects served as a control variable in this analysis. The self-reported drug use of this adolescent sample was highly correlated with the aggregate effects of the independent variables tested. On an individual basis behavioral intention was related to all categories of drug use. Higher levels of intention were related to higher levels of self-reported drug use. With few exceptions, as grade level rose, so did self-reported drug use, and the stronger the time commitment to academics and the higher the grade average, the less drug use was reported. Further, the more positively disposed a student was toward teachers, the less cigarette and alcohol use was reported. Specific correlation coefficients and predictive regression equations varied across drug and school categories.

Cynthia A. Wolford
300 White Hall
Kent State University
Kent, Ohio 44242

Thursday, April 10
10:15-11:45 a.m.

SELF-CONCEPT RELATIVE TO EXPECTED USE OF ALCOHOL AND TOBACCO AND IDENTIFICATION OF CHILDREN OF ALCOHOLICS. Robin Hall, Pennie Core Michael Young, University of Arkansas.

The purpose of the study was: (1) to identify levels of "expected use" of alcohol and tobacco among second grade children (2) to determine if differences exist in levels of self-esteem between children who expected to use these substances and children who did not expect to do so, and (3) to determine if differences exist in levels of self-esteem between children identified as "suspected child of alcoholic parent" and children not so identified. The study was conducted as part of the evaluation of a statewide drug education project. Results reported here are from face to face individual interviews conducted with second grade students (N=105) from seven elementary schools participating in the project. Children participating in the interview were selected utilizing a random number process, matching the number selected to the student number listed in the teacher's roll book. Each interview lasted from 15 to 30 minutes depending upon the individual child. The interview included questions regarding self-esteem (as developed by Marsh) as well as items concerning use and expected use of cigaretts, smokeless tobacco and alcohol. None of the structured questions asked about parental drinking. When asked about their own use of alcohol some children volunteered information about parental drinking. In these cases follow-up questions (1) How do you feel about Mom/Dad's drinking? (2) If you could tell your Mom/Dad anything about their drinking what would say? Children who indicated that parental drinking made them sad/upset and who indicated a strong desire to see their parents stop drinking were identified as suspected children of alcoholics. Data for expected use were ananyzed in a series of contingency tables utilizing the chi square test of the independence of categorical variables. Significant differences(p .01) were noted for sex (1) expected use of smokeless tobacco (2) expected use of alcohol and (3) description of drinking habits. Data related to self concept were analyzed utilizing the analysis of variance procedure. Significant differences were noted between children who expected to use alcohol and those who did not on the "relationship with parents" subscale. Children identified as suspected children of alcoholics scored significantly different from other children on the "physical attractiveness" and "sports ability" subscales as well as the overall self-concept. Results of the study should be of value in treatment of alcoholic families.

Robin Hall
HPER 308
University of Arkansas
Fayetteville, AR 72701

Thursday, April 10
10:15-11:45 a.m.

An Exploratory Study of the Experimental Use of Cigarettes Among a Group of Kindergarten Through Fourth Grade Children

by Ann W. Jones, D.Ed., Rutgers University and
Suzanne Shoemaker, B.S., Pennsylvania State University

An emerging area of research suggests that the age of experimentation with cigarettes is declining to the elementary grades where it is estimated that 100,000 or more pre-adolescents smoke regularly (one or more cigarettes per week). Early onset of and continuation with cigarettes throughout one's youth appears to be a critical determinant of life long smoking. Some investigations report that children state they tried their first cigarette as young as age five or six. Yet, the literature has failed to address adequately the initiation of cigarette smoking, and therefore there is a lack of understanding of the mechanisms involved in the etiology of this behavior. This study explores the development of cigarette smoking among a convenience sample of kindergarten through fourth grade school children. Recognizing the complexity of the emergence of cigarette smoking, both children and their parents were included in the investigation.

Two newly developed survey instruments were used to gather the data. The parents' survey was a self-administered questionnaire, and the children's survey was in an interview format.

The surveys were administered through the school utilizing the following protocol. Through their school teacher, the children received a packet of materials to carry home to their parents. The packet contained a letter from the principal, a letter from this investigator, an explanation of the study, an informed consent document, a parent questionnaire, and a self-addressed business reply envelope. The children of the parents who completed a parent questionnaire and signed the informed consent form were interviewed.

The results indicate that social factors, children's perceptions regarding cigarettes, temperamental characteristics, parental smoking attitudes, parental perceptions of children's use of cigarettes, and parent/child discussions of certain tobacco topics, at least in terms of bivariate relationships, are related significantly to children's experimentation with cigarettes.

Ann W. Jones, D.Ed.
Rutgers University - GSE
10 Seminary Place
New Brunswick, New Jersey 08903

Thursday, April 10
10:15-11:45 a.m.

CORRELATES OF ALCOHOL KNOWLEDGE AMONG COLLEGIANS: 1983-1985: IMPLICATIONS FOR EDUCATION. Ruth C. Engs, HPER, Indiana University Bloomington, IN 47405; David J. Hanson, Sociology, SUNY, Potsdam, NY 13676.

The purpose of this study was to compare the alcohol knowledge of a sample of collegians at colleges from throughout the United States to collegians from the same colleges studied in 1983. It was hypothesized that increased knowledge of alcohol would occur due to the increase of alcohol education programming on the college campus.

An anonymous pre-coded reliable and valid instrument, The Student Alcohol Questionnaire was administered to 72 of the 82 colleges which had participated in the previous study. The original colleges were selected by a stratified sample technique. The T-test techniques comparing the mean score on the knowledge test between the two time periods was used. The knowledge test contained 36 items.

The sample contained 4,885 students in 1983 and 4,266 in 1985. There was no significant difference in the mean knowledge score between the two time periods. However, there was a significant ($p < .05$) increase in the knowledge score between the two time periods for males (21.5 vs 22.1), whites (21.4 vs 21.7), Roman Catholics (21.4 vs 21.8) and for college communities under 100,000 individuals (21.2 vs 21.6). Though the scores indicated a statistical significant increase, this may not have been a practical increase in terms of knowledge concerning alcohol as in all cases the increase was under two percent. Since the increase was small and only found in certain demographic sub-groups it is recommended that continuous effort in alcohol education be undertaken at the university level.

Dr. Ruth C. Engs
HPER Rm 116
Indiana University
Bloomington, IN 47405

Thursday, April 10
10:15-11:45 a.m.

SOURCES OF INFORMATION ABOUT ALCOHOL AND DRUGS AMONG HIGH SCHOOL STUDENTS. Kenneth H. Beck, University of Maryland; Terry G. Summons, City of Bowie; John M. Hagen, Bowie Senior High School.

The purpose of this investigation was to examine the sources of information that high school students use for questions about alcohol and drugs. Specifically, the concern of this study was to determine what sources of information about alcohol and drugs high school students felt were the best and where the students would go first if they had a question about drugs and alcohol. This was done to identify effective communications channels for alcohol/drug education for this age group.

An anonymous survey questionnaire was administered to over 2,300 students in a typical middle class high school. Students were asked to respond to several items which measured: demographics, quantity/frequency of alcohol consumption, three measures of alcohol abuse, best and first sources of information about alcohol/drugs and a social desirability scale used for validation of self-report answers.

The results revealed that the self-report answers were substantially free of social desirability bias and were considered valid. The results also showed that non-drinkers, non-problem drinkers and females indicated that the mass media (newspapers, books, TV, movies) was their best source of information, problem drinkers and males indicated that their own personal experience was their best source. Non-drinkers and non-problem drinkers indicated they would go to their family first if they had a question about alcohol and drugs, whereas problem drinkers said they would go first to their friends. Teachers were rated very low on both credibility and as a source they would seek out first if students had a question about drugs or alcohol. The results are discussed in terms of potential peer group drug and alcohol information dissemination programs.

Kenneth H. Beck
Safety Education Center
Department of Health Education
University of Maryland
College Park, MD 20742

Thursday, April 10
10:15-11:45 a.m.

THE EATING AND EXERCISE BEHAVIOR QUESTIONNAIRE. Jeffrey E. Brandon and J. Mark Loftin, University of New Orleans

Behavioral techniques are widely used in weight loss education. Antecedent control and environmental planning are among those techniques utilized. A behavioral questionnaire, the Eating and Exercise Behavior Questionnaire (EEBQ), was developed to obtain standardized descriptive information on individual eating behavior. Such an instrument not only has use as a motivation technique for exploration of situational variables influencing one's eating behavior, but also has utility in testing assumptions of the behavioral techniques, and as a dependent measure in weight loss research. A prerequisite to using the EEBQ for research is determining reliability and validity estimates. Test-retest reliability, measured over a two week period for 24 subjects, was determined to be .95. A research study was utilized in obtaining concurrent validity information for the EEBQ. Higher scores reflect eating behaviors thought to be conducive to weight loss or weight maintenance, while lower scores should be associated with problematic eating. Thus, obese individuals should have significantly lower EEBQ scores than normal weight individuals. Using EEBQ total scores from 54 obese (above the 70th percentile for body weight and right tricep skinfold measurements according to the National Health Survey Standards) and 54 normal weight individuals (body weight and skinfold scores below the 60th percentile), analysis of variance revealed significant differences ($F=20.37$, $p < .05$) between the two groups. The lower scores of the obese group tend to provide concurrent validation evidence for the EEBQ. An example of the uses of the EEBQ concerned evaluating basic assumptions of applying behavioral interventions with the obese. Mahoney (1975) was perhaps the first to suggest that these interventions were based upon untested assumptions, including the assumption that the eating behavior of normal weight and obese individuals differed. Analysis of variance was used for each EEBQ item from the above study group. As predicted, results indicated that normal weight individuals exercise more regularly than the obese. However, of the several eating behavior antecedent questions, there were generally few significant differences between groups. The only exception was that the obese tend to overeat in response to stress, boredom, and depression. In summary, the EEBQ has use in providing an overview of individual eating patterns and in testing the basic assumptions of behavioral weight loss interventions. Additionally, it is currently being used as a dependent measure in ongoing weight loss research.

Jeffrey E. Brandon
Department of Health and Physical
Education
University of New Orleans
New Orleans, LA 70148

Thursday, April 10
10:15-11:45 a.m.

EVALUATION OF THE NUTRITION ACHIEVEMENT TEST INSTRUMENT

Thomas W. O'Rourke, Ph.D., Department of Health and Safety Studies, University of Illinois, Urbana-Champaign, Illinois

The importance of nutrition as a significant determinant on status has been well established. The purpose of this study was to evaluate the Nutrition Achievement Test (NAT). This instrument, developed by the National Dairy Council, is widely used and knowledge about its reliability and item quality could enhance the efforts of those involved with nutrition education aimed at school aged youth. The NAT is not one instrument. Rather, there are three NATs: test one for kindergarten through second grade; test two for grades three and four; and test three for fifth and sixth graders. There are varying numbers of test items for different grades due to differences in attention span, time needed to respond to items as well as content covered. Data were collected from 4500 students in grades K-6 as part of the Nutrition Education and Training (NET) program. Through regional directors, teachers were informed about the availiability and usefulness of the NAT and encouraged to use it. Data from grades K-2 were keypunched directly from test forms. Digitek score sheets were used by students in grades 3-6. A NAT computer scoring program was developed, and data were analyzed by each grade. Summative test statistics were calculated that included mean, median, range, standard deviation, standard error of measurement and reliability using the KR 21 formula. Difficulty and discrimination indices for each item were also calculated. In most instances the evaluative results of the NATs were favorable. Difficulty and discrimination indices for most test items fell within acceptable ranges. Reliability and standard error of measurement were also generally satisfactory. The test statistics results indicated the overall usefulness of the NAT as a diagnostic and evaluative instrument.

Thomas W. O'Rourke
Department of Health and Safety
University of Illinois
Champaign, IL 61820

Thursday, April 10
10:15-11:45 a.m.

THE HEALTH FAIR AS A HEALTH PROMOTION STRATEGY: EFFECTS ON HEALTH RISK BEHAVIORS. Chudley E. Werch, David A. Schroeder, University of Arkansas

Studies which have attempted to assess health fair outcomes have generally been limited to the collection of subject satisfaction and participation data, while ignoring measures of behavioral change and the evaluation of specific activities within the health fair setting. In addition, studies examining health fair impact have typically excluded appropriate control groups, thereby reducing the investigator's ability to attribute beneficial changes to participation in the health fair. The purpose of this study was to determine if subjects attending a university health fair experienced greater reductions in health risk behaviors as compared to subjects not attending the health fair. A second purpose of this study was to assess subject's reactions to the specific activities within the health fair using measures of participation, enjoyment, and self-reported changes in health knowledge and habits. The health fair, which was held in a university student union ballroom, provided displays with the following two types of activities: 1) information on health topics and services, and 2) screenings for specific diseases or disease symptoms. Six weeks after the conclusion of the health fair, a random sample of subjects who had attended the health fair were sent questionnaires. Three hundred and four subjects participated in this study. Subjects in the health fair with health risk appraisal condition were mailed a "Health Fair Evaluation Questionnaire" and a follow-up "Wellness Check - Health Risk Appraisal". Subjects in the health fair only condition were sent the Health Fair Evaluation Questionnaire only. Subjects in a General Psychology control condition completed the Wellness Check - Health Risk Appraisal during a regular class period. This study's results indicate that subjects attending a university health fair did not experience greater reductions in health risk behavior as compared to control subjects who did not attend the fair. This study also found that the screening activities that were most frequently attended or were most often cited as being related to enjoyment and to knowledge and habit change were those for blood pressure, pulmonary functioning, body fat assessment, and the health risk appraisal. Finally, this study indicated that the health fair activities and materials that were least often used or were least likely to be cited as being related to enjoyment and to health change were the sickle cell anemia screening activity and informational brochures and pamphlets that were made available during the fair.

Chudley E. Werch, Ph.D.
HP 308J
University of Arkansas
Fayetteville, AR 72701

Thursday, April 10
10:15-11:45 a.m.

A REVIEW AND ANALYSIS OF BEHAVIOR MODIFICATION TECHNIQUES USED IN SUCCESSFUL WEIGHT LOSS PROGRAMS.

Onie R. Grosshans, University of Utah.

The purpose of this study was to review previously conducted weight loss studies with the intent of identifying the setting and programs conducted with otherwise healthy persons, and comparing this data with the average amount of weight loss which occurred during the designated time span of each program. A Medline and Colleague computer search was conducted to identify those studies which fit the descriptors "weight loss" and "behavior modification." Thirty-five studies were originally selected to be evaluated, but upon closer reading, the author determined that 10 of the 35 reported studies either did not provide sufficient data to be of benefit, were not actually studies, but instead discussions of weight loss and behavior modification techniques, or were summary reports of a combination of weight loss programs. The findings revealed one possible explanation for the differences that occurred between the more successful and least successful weight loss programs was the time allotted to follow-up. The least successful weight loss groups' average follow-up time is almost double that of the more successful studies: an average of 53 wks compared to an average of 27 wks. As a result of this time discrepancy, one would assume the attrition rate to be higher and the average weight loss to be lower than for subjects followed for approximately 6 months. This assumption is born out by comparing the two groupings at the end of their treatment phases of the program. An average of 4 weeks of treatment separates the more successful from the least successful weight loss programs (8 wks vs. 12.8 wks). More revealing is the average treatment weight loss, 13.3 lbs. for the more successful programs, and 15.9 lbs. for the least successful weight loss programs. So, at the end of the treatment period, the least successful programs actually had an average weight loss greater than the more successful weight loss programs. Obviously, the ability to maintain this weight loss over a lengthy follow-up time period (53 wks vs. 27 wks) was impossible. At the end of follow-up, the more successful weight loss group averaged 10.9 lbs. lost, while the least successful group actually had a gain of 4.9 lbs. And, when the weight loss is averaged per week for the entire length of the study (treatment plus follow-up wks), the difference is not as great: .43 lbs. lost per wk for the more successful group, compared with a gain of .10 lbs. per wk for the least successful group. Self-monitoring/observation, stimulus control, and cognitive restructuring were used by both groupings, but only the more successful weight loss used behav. contracting, positive re-inforcement, and chaining.

Onie R. Grosshans
College of Health N-211
Health Education Dept./ Un. Utah
Salt Lake City, Utah 84112

Thursday, April 10
10:15-11:45 a.m.

LIMITATIONS OF LOCUS OF CONTROL RESEARCH IN EXPLAINING ADDICTIVE BEHAVIORS.

Janelle K. O'Connell, J.H. Price, University of Tennessee Memorial Research Center & Hospital, Knoxville, Tennessee 37920.

Significance. A better understanding of health locus of control research can contribute to understanding responses of individuals to health care interventions attempting to deal with addictive behaviors.

Purpose. The purpose of this critical review of the literature on locus of control and obesity and smoking behavior is to assess the reasons for the controversy that exists in the literature between internal and external orientations and addictive behaviors.

Procedures. A computer search of the literature was conducted using Medline, Dissertation Abstracts and Psychological Abstracts. Also a hand search of the literature was conducted to compensate for those journals not covered in the aforementioned reviews.

Results. 29 studies were located on locus of control and smoking behavior; 14 used Rotters I-E scale, 7 used health locus of control scales, and 8 used a variety of other scales. 10 studies found no significant difference between internals and externals on a variety of smoking behaviors (i.e., smoking reduction or cessation). 32 studies were found on locus of control and obesity; 9 studies found no difference in locus of control between obese and non-obese subjects, 13 studies found that internals lost more weight in weight reduction programs, and 10 other studies looked at a variety of weight control behaviors. The lack of consistency in the findings can be explained by five major variables: 1) variety of locus of control instruments used; 2) inappropriately used locus of control instruments; 3) inadequate conceptualization of locus of control; 4) inappropriate analysis of locus of control data; 5) variety of subjects studied.

Conclusions. It can be concluded that the full potential of locus of control research has not been reached in relation to the addictive behaviors of obesity and smoking. The inconsistencies in the literature appear to be iatrogenically induced and may not be due to an anemic health behavior model (locus of control).

Dr. Janelle K. O'Connell
University of Tennessee Memorial
Research Center & Hospital
Knoxville, Tennessee 37920

Thursday, April 10
10:15-11:45 a.m.

ANALYSIS OF PERCEIVED STRESS OF COLLEGE STUDENTS.

Dewayne J. Johnson and Abigail Collier, The Florida State University; Virden Evans and Joe P. Ramsey, Florida A&M University.

The purpose of this investigation was to analyze the perceived stress of college students in an attempt to identify the major sources of stress. Subjects were 403 college students enrolled at major universities. Subjects represented all levels, freshman to seniors. Students were asked to complete a questionnaire that included a personal data sheet and a stress inventory. The stress inventory provided scores in 10 areas related to stress plus a total stress score. These areas included deprivational stress, patterns of behavior, frustration, self perception, anxious-reactive personality, overload, knowledge, opinion, coping strategies, and a life events score. Stepwise multiple regression was run (all subscores were used as independent variables) in an attempt to determine the best set of factors that would explain the variation in the total stress score (dependent variable) of students. Results indicated that 90% of the variation in the stress of college students could be attributed to type A personality, anxiety, the demands of college life, and a low self concept. Results further indicated that the college students in this study did not perceive their stress levels as being high, or above average. Based on the results of this study, it may be concluded that events and activities associated with college life are not the major stressors for college students, and that intrinsic stressors rather than extrinsic stressors account for the largest percent of the stress of college students.

Dewayne J. Johnson
Movement Science & Phys Ed
The Florida State University
Tallahassee, FL 32306-3045

Thursday, April 10
10:15-11:45 a.m.

RELATIONSHIP BETWEEN STRESS AND TEACHER ABSENTEEISM.

Virden Evans and Joe P. Ramsey, Florida A&M University; Dewayne J. Johnson and Shirley Reese, The Florida State University.

The purpose of this investigation was to study the effect of stress related illness on the absenteeism of K-12 teachers. Subjects were 435 K-12 teachers who were randomly selected and asked to complete a questionnaire on stress and a personal data sheet. The stress inventory was constructed following the summative model with a 1-5 Likert scale. The inventory provided 15 subscores plus a total stress score. ANOVA was used to analyze the data. The independent variables used for the data analysis were physical illness, mental illness, and absenteeism, while the stress scores served as the dependent variables. Results indicated that teachers who experienced either stress caused physical or mental illness and were absent more than 6 days perceived their stress to be significantly greater than teachers who did not experience both stress related illness and high absenteeism. The one subscore that did not produce significant differences was related to the stress caused by decision making. The results of this study support assumptions made in the literature that stress is a major factor in worker absenteeism. It may be concluded that teachers can perceive when stress has reached a dangerous level, but do not have the coping strategies that enables them to prevent illness and therefore absenteeism.

Virden Evans
Dept. of Physical Education
Florida A&M University
Tallahassee, FL 32301

Thursday, April 10
10:15-11:45 a.m.

THE ROLE OF PHYSICAL ACTIVITY IN PREDICTING HEALTH STATUS AND LIFE SATISFACTION OF THE ELDERLY. Catherine A. Kennedy, Colorado State University.

The purpose of the study was to measure changes in perceived health status and life satisfaction after a 15 week walking program for elderly subjects. The subjects, between the ages of 65 and 75 years, were randomly selected from a larger sample of 600 elderly respondents. The participants were selected on the basis of responding that their self-reported health and general life satisfaction were both considered to be "Fair" on a scale of (Excellent, Good, Fair, Poor). After support letters for participation were received from each subjects' personal physician the individualized walking program began. Subjects were asked to walk four times a week for thirty minutes at the location and time of their choice. There was no stipulation made as to distance traveled or pace during the thirty minute period. The walking program lasted 15 weeks with weekly meetings to address questions and concerns. Mid-week telephone communication also existed to keep close contact with subjects. A pre and post questionnaire was administered to all participants. The instrument consisted of selected items as multiple predictors to measure life satisfaction, health status and physical activity. The statistical analysis utilized was path analysis which goes beyond correlates of life satisfaction in that it permits investigation of indirect as well as direct effects of variables. There is reason to believe that some factors influence life satisfaction indirectly through other variables. After the walking program terminated the following results were identified. Only sixteen participants still felt their life satisfaction to be "fair", fifty-three responded "good" while thirty-one stated their life contentment was "excellent". Respondents reported their self-assessed health as follows: twenty-three "fair", sixty-eight "good", and nine "excellent". As in other research, self-reported health is found to be highly correlated with physician diagnosis. In eighty-one percent of the cases the physician agreed with the participants self-assessed health status after the program ended. In four cases the physicians rated the subjects health above the individual. Other valuable results that developed: Weight loss by more than sixty percent of the participants, increased socialization, a few incidents of lowered blood pressure, four participants were taken off medication as a result of program.

Catherine A. Kennedy
Health Education
Colorado State University
Fort Collins, Colorado 80523

Thursday, April 10
10:15-11:45 a.m.

EFFECTS OF A FAMILY LIFE EDUCATION PROGRAM. Michael Young and John Zody, University of Arkansas.

This study evaluated the effects of an innovative program in family life education which was funded by the Office of Adolescent Pregnancy. School and community teams from across our state participated in a one week family life education training workshop. Following the workshop experience team members returned to their respective communities to implement school programs based on the workshop experience and a model curriculum. This abstract gives the results of a first year pilot program implemented by a school-community team from a major metropolitan school district. The convention report will also include the results of an expanded second year program in the same district. Ninth grade students from two district junior highs served as subjects. Students from school "a" served as the experimental group and received 25 hours of instruction over a five week period. Students from school "b" served as the control group and participated in the regular curriculum (not family life). Both groups were tested before and after the curriculum intervention. Evaluation instruments included knowledge, attitudes, self-concept and locus of control. Written parental permission was required for participation in the course and the evaluation (participation rate exceeded 94%). In the pilot study data were collected from 426 subjects. Data were analyzed utilizing analysis of variance of the differences between pre and post test scores. Analysis of the data indicated that instruction resulted in significant (p .05) gains in knowledge. Changes were also noted in selected attitudes and selected aspects of self concept and locus of control. Results indicate that a program based upon a model curriculum and a workshop training experience can produce positive benefits. During the second year of the program two full time teachers were employed to extend family life education to all junior high schools in the district. The convention presentation will include these second year results.

Michael Young
Health Education Program
University of Arkansas
Fayetteville, AR 72701

Thursday, April 10
10:15-11:45 a.m.

AN EXAMINATION OF WORKSITE HEALTH/FITNESS PROFESSIONAL PREPARATION PROGRAMS. Randall R. Cottrell, University of Oregon; Lorraine G. Davis, University of Oregon; Jane M. Gutting, University of Oregon.

The purpose of this study was to examine worksite health/fitness professional preparation programs in the United States. Worksite health/fitness promotion is a relatively new field. Much discussion has occurred regarding requisite skills for entry into the profession and guidelines have been written. New professional preparation programs are burgeoning, but little has been done to examine programs already in existence. A survey was developed and mailed to 200 randomly selected health education programs from the 1985 AAHE Directory of Institutions Offering Specialization in Undergraduate and Graduate Professional Preparation. One hundred and one usable surveys were returned for an effective response rate of 51 percent. Results indicate that 54 percent of respondents currently have a specific independent program in health/fitness promotion. Forty-three percent of those not offering a program anticipate developing a program in the next two years. Most programs offer degrees at the bachelors level (n = 41) followed by masters (n = 24), doctorate (n = 4), and certificate (n = 2). Programs are most frequently housed jointly in health education and physical education departments (46.3%). Physical education departments house 31% of programs and health education departments house 15%. From a list of 25 possible course offerings in health/fitness promotion, the five courses most frequently required of students in responding programs were exercise prescription, first aid, evaluation procedures, nutrition/diet management, and CPR. The five least required included occupational health, aging/gerontology, safety, public relations and counseling methods. In general, those course offerings that were perceived most important by respondents were also the courses most required. Future job placement was perceived to be high by most respondents. Private health clubs were cited as the most likely site for employment, followed by large business, hospitals, public employee groups, colleges/universities. Small business was seen as the least likely source of employment. Comparative differences based on geographic location and department housing the program were also examined.

Randall R. Cottrell
School & Community Health
257 Esslinger Hall
University of Oregon
Eugene, OR 97403

Thursday, April 10
10:15-11:45 a.m.

Health Education and Special Education: An investigation into joint program interests.

Nagy, M.C., Nagy, S., University of Alabama, Tuscaloosa, Alabama 35486.

Purpose: To determine (1) the extent of formal health education preparation required of special education majors and (2) the perceived need for health education by administrators of special education preparation programs.
Methods: A one-page questionnaire was mailed to institutions providing certification in special education at the undergraduate level as identified by the National Directory of Special Education Preparation Programs (N = 415). Six weeks after the initial mailing a second mailing was performed. Data collection was terminated five weeks after the second mailing.
Results: Of the 415 institutions selected, 30 had dissolved their programs at the time of mailing. Usable data were received from 298 institutions (77%). Fifty-six percent of the programs acknowledged a mandatory health education requirement for their special education majors. Most frequently cited as health education requirements were personal health (55%), first aid (31%) and community health (24%). Program administrators identified human sexuality (65%), personal health (61%), first aid (61%), nutrition (56%) and drug education (56%) as health education courses that would be of benefit to special educators.
Conclusions: Findings indicate that administrators of special education teacher preparation programs feel that special education majors would benefit from coursework in health education. Although two thirds of the administrators identified health education courses which would benefit their majors, only slightly more than half had a mandatory health requirement. Of the health education courses fulfilling the mandatory requirement, there were discrepancies when compared to those perceived important by administrators. Indications are that many special education administrators are unaware of the course content in health education that may be of benefit to special education majors. Implications are that health education and special education as subject fields need to cooperate more in the preparation of special educators.

Dr. Mary Christine Nagy
The University of Alabama
Area of Health Education
P. O. Box 1967
University, AL 35486

Thursday, April 10
10:15-11:45 a.m.

PERSPECTIVES ON HEALTH EDUCATION: A COMPARISON OF THE SECONDARY AND ELEMENTARY HEALTH EDUCATION SPECIALIST.

Steven R. Furney, Southwest Texas State University;
Franklin A. Calsbeek, Southwest Texas State University.

The purpose of this study was to examine secondary and elementary health education majors to determine if differences existed on selected key issues within their field of study. The subjects for this study were 207 undergraduate students enrolled in a mid-sized southern university. All subjects were majors or minors in health education (secondary level) or were specializing in health education at the elementary level. Each of the subjects in this study were surveyed to elicit their responses on a number of critical issues related to the teaching of health education. This study was conducted during the spring, summer, and fall semesters of 1985. The results of this study indicated some interesting facts about secondary and elementary health education students. The health content area seen as most important by the elementary student was nutrition (33.1%), followed by mental health (28.2%) and first aid (13.6%). The secondary health education student viewed drug education (25.6%) as most important, followed by physical fitness (14.9%) and first aid (11.7%). The elementary health education student showed to be more concerned with affecting behavior change, while the secondary health education student was more concerned with imparting knowledge. The secondary major had a slightly higher regard for health education and a more positive outlook regarding the future of education than the elementary major. Both elementary and secondary health education students felt confident regarding their ability to evaluate students and also felt positive toward the new entrance and exit examinations required for teaching certification. This final item refers to standardized exams which must be successfully passed before beginning the teacher preparation program, and successfully passed before teacher certification will be issued. These findings, and others too numerous to mention, help illustrate the differences and similarities between the secondary and elementary health education student. This information may prove useful for academic advisement, program planning or curricular preparation.

Steven R. Furney
Southwest Texas State University
Jowers Center
San Marcos, TX 78666

Thursday, April 10
10:15-11:45 a.m.

THE EFFECT OF A RELAXATION PROGRAM ON REDUCING ANXIETY PRIOR TO ORAL SURGERY.

Barbara E. Jensen, Springfield College, Mary H. Kreitzer, DMD, Longmeadow, MA., Elizabeth E. Evans, Springfield College.

Anxiety responses in dental patients prior to oral surgery include heightened anxiety levels ranging from mild apprehension through extreme fear. The relaxation program developed specifically for this study was designed to help patients deal with these anxiety responses. Adult patients ($N=80$, ages 18-70) who were new patients of a private practice oral surgeon and who were scheduled for tooth extractions were utilized as subjects. Patients had either a local anesthetic (carbocaine 3%) (20 m, 20 f) or a general anesthetic (intravenos injection of diazepam and sodium methohexital or, for longer cases, diazepam, meperidine and sodium methohexital) (20 m, 20 f). Subjects were randomly assigned to the treatment group (relaxation program) or the control group (music) with a double blind design. Prior to the surgery the subject completed the Spielberger State Anxiety Scale, and heart rate and blood pressure measures were taken before and after listening to one of the audio-taped programs. The same physiological measures were recorded at specific time periods during surgery. One week later all patients returned and were measured on state and trait anxiety, the same physiological measures, and a debriefing questionnaire. Males had significantly ($p<.05$) higher blood pressure scores and females had higher heart rates. Females had higher state anxiety scores only on the measures taken before the tape. All physiological measures increased significantly ($p<.05$) when the subject moved to the dental chair for surgery. Repeated measures ANCOVA (age as covariate) analyses revealed significantly ($p<.05$) lower anxiety responses following both tapes; however, the subjects rated the relaxation program as significantly ($p<.05$) more helpful than the music program in reducing the anxiety response.

Barbara E. Jensen
Movement Science
Springfield College
Springfield, MA 01109

Thursday, April 10
10:15-11:45

EFFECTIVENESS OF A HEALTH EDUCATION PROGRAM IN DENTAL PLAQUE REDUCTION. John G. Odom, The Ohio State University; Sylvia S. Odom, Health World Consultants.

Although dentistry's leadership in the preventive health education movement has been largely unrecognized, a strong record of success in prevention and health education has resulted in substantial improvement in the nation's oral health. These accomplishments can be attributed to aggressive preventive approaches to the problem of dental disease. Although fluoridation and sealants have dramatically reduced tooth decay, individual oral hygiene remains the foundation of preventive dentistry. Proper techniques of brushing and flossing teeth are essential to prevent the accumulation of the bacteria laden plaque that causes decay. This study was conducted to determine the effectiveness of a prevention program focusing on techniques for plaque removal. The research was designed to address the question: "Can significant plaque reduction be expected as a result of individual instruction in the principles and techniques of oral hygiene?"

The Plaque Control Record (O'Leary, 1972), an index showing the percentage of tooth surfaces containing plaque, was completed during the patient's initial preventive session and at a follow up appointment approximately two weeks later. Subjects included all 339 patients completing both sessions at The Ohio State University College of Dentistry Prevention Clinic from July 1984 through June 1985. Preventive education focused on personal instruction in techniques of brushing and flossing, nutritional counseling and related topics. Third and fourth year dental students provided instruction and completed Plaque Control Records (PCR). Uniformity of instruction was assured by adherence to a checklist of topics and techniques to be covered and dental faculty were present to perform PCR reliability checks.

Pre and post PCR scores were subjected to statistical examination. Results demonstrated significant plaque reduction with 90.7% of the subjects showing a decrease in plaque. Analysis revealed that patients had an average plaque reduction of 22%. Data were analyzed by age, sex, occupation, and days between pre and post scores. Substantial change occurred in all categories. Ten percent of all age groups showed improvement of more than 50%. Conclusions based on these data suggests that the effectiveness of this health education strategy is evident as nearly 91% of the persons receiving individual instruction in preventive techniques were able to reduce dental plaque and improve their oral health.

John G. Odom
The Ohio State University
Room 3148 Postle Hall
305 West 12th Avenue
Columbus, Ohio 43210

Thursday, April 10
10:15-11:45 a.m.

INTERPERSONAL SKILLS DEVELOPMENT IS VITAL TO PATIENT EDUCATION.

John G. Odom, The Ohio State University

Dentistry has made tremendous advances in the prevention of oral disease. Emphasis on patient education and prevention is vital to continuing this success. However, the effectiveness of prevention instruction depends on the quality of the interpersonal skills (IPS) of individual practitioners and their staff. Consequently many dental schools have included interpersonal skills development as a component of the dental behavioral sciences curriculum.

The purpose of this study was to identify (1) the extent of IPS training in U.S. schools; (2) whether IPS is taught as independent components within or outside of larger behavioral science programs; (3) what models, if any, are used to teach the skills; (4) faculty qualifications for delivery of IPS training; and (5) a general understanding of the content of these programs. Sixty dental schools in the United States were surveyed using both an initial and follow-up mailing. A 71.6% rate of return was achieved.

Results show that 72% of the respondents reported at least one curriculum component emphasizing IPS development and that one third of the schools treat their program as a separate free standing component of a broader behavioral science effort. The majority (61.4%) of IPS instructors are employed full-time, with 44% holding dental degrees, 37% having academic doctoral degrees, and some holding dual degrees. Most schools use modified versions of models developed by Gazda, Carkhuff, Kagan, and Egan. All respondents focused on the communication process and its skill components with instruction typically provided by an interdisciplinary group of clinicians and behavioral scientists. Data also indicated that 83% of instruction is provided through brief orientation lectures followed by small group instruction. Eighty-eight percent of respondents indicated that evaluation of IPS is based on observation and notation of requisite skills demonstrated during role playing, videotaping, or clinic performance. It can be concluded that dentistry recognizes the role of IPS in effective patient education and that IPS training is a vital part of dental education.

John G. Odom
The Ohio State University
Room 3148 Postle Hall
305 West 12th Avenue
Columbus, Ohio 43210

Thursday, April 10
10:15-11:45 a.m.

KNOWLEDGE, ATTITUDES, AND PRACTICES OF PHYSICIANS REGARDING AEROBIC EXERCISE. J.H. Price, J.K. O'Connell, S. Desmond, D. O'Connell, Department of Health Promotion & Human Performance, The University of Toledo, Toledo, Ohio 43606.

Significance. The public is encouraged to turn to physicians regarding exercise programming, therefore physicians need to be well informed and able to give clear, accurate aerobic exercise information. Nevertheless, medical education directed toward fitness assessment and exercise prescription is generally lacking. A review of the literature could find only 2 U.S. studies which addressed attitudes and knowledge of physicians toward exercise.
Purpose. The purpose of this study was threefold: to examine the knowledge of physicians regarding exercise; to examine physicians attitudes toward aerobic exercise; and to examine physicians ability to correctly presecribe aerobic exercise programs.
Methodology. A questionnaire consisting of 47 items was designed by the researchers. The questionnaire contained: background information; knowledge of aerobic exercise physiology; factors associated with prescribing aerobic exercise programs; attitudes toward aerobic exercise; and aerobic exercise prescribing behavior. The last 3 factors were measured on 6 point Likert scales. Due to the length of the questionnaire and the fact that physicians are less likely to respond to questionnaires than other subjects, multi-matrix sampling technique was utilized. The 47 items were divided into 3 questionnaires. A total of 797 internists and family practice physicians were sent one of 3 forms of the questionnaire. Descriptive statistics were utilized to report frequencies, means, and standard deviations as standard statistical packages do not contain programs designed to analyze data from multi-matrix sampling.
Findings. 307 questionnaires were returned, 299 were usable for analysis (37.5%). 94% of the physicians were males, 90% were MDs, 71% were in family practice, 63% were board certified, and 52% had been practicing 21 years or more. 57% of the respondents were not currently engaging in aerobic exercise. Of the 15 knowledge items, 7 were answered correctly by 50% or more of the family practice physicians and 4 were answered correctly by 50% or more of the internists. Those in practice a longer period of time and those who did not personally exercise were less knowledgeable about aerobic exercise. Family practice physicians believed that physicians are obligated to counsel patients on exercise (80%). 44% found developing an aerobic exercise program professionally gratifying; 62% believed that aerobic exercise is important to the health of their patients; and 63% believed that physicians should be role models by regularly engaging in aerobic exercise.

Dr. J. H. Price
Department of Health Promotion &
Human Performance
The University of Toledo
Toledo, Ohio 43606

Thursday, April 10
10:15-11:45 a.m.

THE IMPACT OF RECENT MEDICARE REFORMS ON THE BEHAVIOR OF HEALTH CARE CONSUMERS AND PROVIDERS. Gene Ezell, University of Tennessee at Chattanooga; David Brodsky, University of Tennessee at Chattanooga.

The purpose of this study was to determine the impact of the recent Medicare reforms upon health care delivery. Specifically, data were gathered from 400 elderly persons to assess the extent to which potential Medicare beneficiaries engate in cost-conscious behaviors in receiving health care. The data also examined to which the elderly respondents decided to forego needed health care because they could not afford treatment. Also, approximately 200 physicians, hospital administrators and nursing home administrators were interviewed to determine the effects of Medicare reforms upon their respective roles in health care delivery to the elderly. The data also examined the extent to which the elderly respondents have decided to forego needed health care because they could not afford treatment. The conclusions of the study were: 1) Older persons continue to utilize health care services at a relatively high level; 2) very few elderly persons behave in ways which fit a 'careful consumer' model; 3) a significant proportion of elderly persons forego purchasing health care services in order to save money; 4) health care providers have altered their ways of treating patients in order to reduce costs; and, 5) recent Medicare reforms have been effective in reducing health care costs. This study was funded by the Andrus Foundation/American Association of Retired Persons.

Gene Ezell
Department of HPER
University of Tennessee
at Chattanooga
Chattanooga, Tennessee 37403

Thursday, April 10
10:15-11:45 a.m.

The Legal Liability Of The Term Contraceptive.

Philip A. Belcastro, Borough of Manhatten College.

Since the IUD in the 1920s, progestin only,low dose (<50 mg.) estrogen pills, and soon progestin and levonorgestrel implants the legal definition of "contraceptive" has been inadequate. The advent of RU-486 and LHRH antagonists such as Buserelin and Naforelin underscore a new generation of fertility control drugs not intended to be contra-conception. The purpose of this paper was to establish whether or not there is a legal liability to the use of the term contraception to describe these agents. A review of federal and state statutes was conducted to address this question. Recent state and federal statutes responding to in-vitro and in-vivo fertilization techniques have protected the "human conceptus" from experimentation. The argument is that there is no justification for exposing a "fertilized egg" to risk that has no therapeutic value to it. The focal point here is that the "fertilized egg" was created by a medical technique. The question is whether in-vivo "fertilized eggs" created by chemicals which allow ovulation and fertilization yet thwart implantation, are "fertilized eggs" created by medical techniques. The argument against would be physicians using such chemicals do not cause fertilization, which is the case with in-vitro techniques. The argument for is that artificial insemination, embryo transfer and GIFT do not cause fertilization yet are techniques for which these laws were designed to control. The second question is whether or not the FDA will rule that such chemicals and devices were purposely mislabeled, prescribed, and promoted as contraceptives--agents which prevent conception. Such a ruling would use the previous outlined argument as a basis for a wrongful-death suit. Thus it is concluded that the term contraception is obsolete and subject to legal liability. It is recommended that the term contraception be immediately abandoned for the terms primary and secondary birth-control. Whereas primary birth-control methods are methods which prevent fertilization--the formation of the zygote and secondary methods either prevent or terminate implantation. It is also recommended that public and school health educators incorporate this working definition of birth-control into their practice.

PHILIP A. BELCASTRO, Ph.D.
2114 VOORHIES AVE.
BROOKLYN, N.Y. 11035
BOROUGH OF MANHATTEN COLLEGE

Thursday, April 10
10:15-11:45 a.m.

AUTOMOBILE SEATBELT USAGE IN EUROPE

R.N. Godsen and C.A. Godsen,
College of Charleston, SC 29424

This study was undertaken in order to estimate recent auto seatbelt usage in Europe. More than two-hundred-ten thousand observations were made in fourteen Western European countries over a seven-week period during June and July of 1985. Data were collected at standard locations and were recorded using previously reported methods. Any driver or front-seat passenger observed wearing a seatbelt was considered as a user. As you can see, the overall picture is quite good there; however, one finds considerable variation.

SUMMARY OF EUROPEAN SEATBELT USE, SUMMER 1985

Country	N	Percent Use
Austria, Switz., Lichtenstein	17125	63.8
Benelux	20898	54.7
France	30607	37.1
W. Germany	43318	91.9
Great Britain	38898	92.5
Italy	15800	1.1
Scandinavian	44112	86.0

Taken as a whole, these data support the notion that European drivers and passengers use their seatbelts significantly more than their US and Canadian counterparts. Further, while the data generally support the contention that compulsory use laws can be successful, the situation in France and Italy ought to alert proponents of such laws that this success is not automatic.

Richard N. Godsen
Department of Physical Education
College of Charleston
Charleston, SC 29424

Thursday, April 10
10:15-11:45 a.m.

A COMPARISON OF PEAK TORQUE DIFFERENCES BETWEEN DOMINANT AND NONDOMINANT LEGS DURING EXTENSION AND FLEXION MOVEMENTS.

Robert E. Allen, University of Florida; Mustafa A. Hayat, State of Kuwait; Leo K. Tennant, University of Florida; Peter A. Indelicato, J. Hillis Miller Health Center,University of Florida.

It is generally accepted that the knee is the most vulnerable joint in the body related to sports injury. In certain clinical settings orthopedic surgeons, physical therapist, and other medical professionals are utilizing the uninjured limb as a model or criterion reference in the rehabilitation process. In order to validate this practice the investigators believe it is necessary to determine if preinjury differences exist between limbs. The purpose of this study was to determine if differences existed between the mean strength scores of the subjects' two legs during extension and flexion movements at three functional speeds. Peak torque data, as measured by a computerized isokinetic dynamometer, were obtained on subjects with a mean age of 22.4 years at speeds of 60°/sec, 180°/sec, and 240°/sec. Data were analyzed using ANOVA with a 2 (right and left) x 3 (speeds) x 50 (subjects) design. The results revealed that peak torque generated by the dominant (stronger) leg was significantly greater than that generated by the nondominant (weaker) leg for both extension and flexion movements at all treatment speeds. Results also indicated that the preferred leg was not always the stronger leg. In view of these findings, the practice of rehabilitating the injured leg to 80 or 85 percent of the peak torque that is generated by the uninjured leg is a questionable practice. The logic of this practice appears sound in theory, but may prove to be inadequate. For example, if the weaker leg or the nondominant limb is the uninjured limb (model), then the rehabilitation process may be only partially completed when the individual is allowed to return to strenuous activities. Based on the results of this study, the investigators suggest that the injured leg be rehabilitated to near 100 percent of the uninjured leg prior to engaging in strenuous activity.

Dr. Robert E. Allen
Room 303, Florida Gym
University of Florida
Gainesville, FL 32611

Thursday, April 10
12:15-1:45 p.m.

AN ANALYSIS OF THE ACCELERATION TECHNIQUES OF ELITE ICE HOCKEY PLAYERS

Nancy L. Greer, University of Massachusetts; Charles J. Dillman, United States Olympic Committee; Jack Blatherwick, AHAUS Sport Science Committee.

An analysis of movement and velocity patterns in a typical game of Ice Hockey has shown that players react to game situations using brief periods of acceleration lasting less than two seconds and requiring two or three strides. In an attempt to improve the "quickness" of players in making these movements, biomechanical techniques have been used to investigate the factors which contribute to the ability to cover the greatest distance and reach a peak velocity after three strides. The subjects for the study were 189 participants in the summer camp program sponsored by the Amateur Hockey Association of the United States (AHAUS) and included Midget and Junior skaters (15 to 19 years of age). The players were filmed, using standard cinematographical techniques, while skating the first 20 feet of a 120 foot acceleration test. Performance and mechanical variables (including angle of the trunk, hip, knee, leg, arm, and elbow) were evaluated at both take-off of the propulsive leg and touch-down of the recovery leg. Significant correlations were observed between many of the measured angles and the criterion performance scores. Multiple regression techniques were used to determine which variables contributed significantly to a prediction of the performance scores and the resulting multiple correlation coefficient values ranged from R=0.80 to R=0.89. Variables which were consistently selected for inclusion in the regression models were: stride rate, leg angle at take-off, hip flexion at take-off, knee angle at touch-down, and elbow angle at touch-down. The results of these analyses are of benefit in skating instruction as well as in development of on- and off-ice exercises to improve performance.

Nancy L. Greer
Department of Exercise Science
University of Massachusetts
Amherst, MA 01003

Thursday, April 10
12:15-1:45 p.m.

EVALUATION OF THE ASSUMPTION OF CONSTANT DRIVING POWER FOR THE PREDICTION OF ALTITUDE AND WIND EFFECTS ON SPRINT TIMES. Jesús Dapena, Michael Feltner, Indiana University.

Sprint times are affected by altitude and wind. This study is part of a project directed to find a method to correct the time of any 100 m race to conditions of zero altitude and wind. Runners are subjected to two horizontal forces: F_p (propulsive force exerted by the ground), and F_R (braking force exerted by air resistance). In the top-speed part of a race, both forces have the same magnitude, and velocity is constant. At a greater altitude and/or with a tailwind, F_R is smaller, and the athlete can accelerate further. As the athlete moves faster, F_R increases and F_p decreases, and equilibrium is eventually reached at a faster velocity. To calculate the effects of changes in altitude and/or wind, it is necessary to know the value of F_R at any velocity, altitude, and wind conditions, and the value of F_p at any velocity. F_R can be estimated rather easily, but F_p presents problems. Three approaches were considered for the prediction of F_p: (A) assume that F_p is constant at all velocities; (B) assume that the product $F_p \cdot v$ (the driving power exerted by the ground on the athlete) is constant; and (C) find an empirical equation for F_p as a function of velocity. Approach A is unrealistic: the maximum force that a muscle can exert is known to decrease with increased speed of shortening; therefore, Fp will decrease with increased velocity. Approach B might be better: if F_p decreases as velocity increases, perhaps the product $F_p \cdot v$ will not change much with velocity. If so, a single number (driving power) would permit immediate calculation of F_p for any velocity of a given athlete. Approach C could be very accurate, but it would require first to find a (possibly complex) function for each subject. The purpose of the present study was to evaluate the hypothesis of constant driving power at different speeds. For this, 11 athletes were filmed in two sprint races (t=10.53-12.00s; mean=11.11s). The films were projected and digitized, the data were smoothed, and time derivatives were calculated. Displacement vs time, velocity vs time, acceleration vs time, and net horizontal force (Σ F) vs time graphs were obtained for each athlete. Σ F is the difference between F_p and F_R. From the known values of ΣF and F_R for each velocity, the value of F_p for that velocity was calculated. Finally, a driving power ($F_p \cdot v$) vs velocity graph was produced. This graph had a roughly parabolic shape, with a very steep negative slope near maximum velocity. Conclusion: driving power is not at all constant across different running speeds, and therefore approach B cannot be used. An F_p vs velocity function will have to be derived empirically for each athlete.

Jesús Dapena and Michael Feltner,
Department of Physical Education
HPER
Indiana University
Bloomington, IN 47405

Thursday, April 10
12:15-1:45 p.m.

A KINEMATIC ANALYSIS OF THE TRIPLE JUMP: A PRE AND POST SEASON COMPARISON OF AN ELITE FEMALE JUMPER.

Hashem Kilani, University of Illinois; Carol J. Widule, Purdue University.

In October, 1984, a female, elite long jumper who showed potential for excelling in the triple jump, was filmed at 80 fps. The film records were digitized and selected kinematic characteristics were obtained from a FORTRAN program run on a CDC 6600 computer. In comparing the results of the film analysis with the available coaching and research literature, the S's triple jump pattern was found to be most discrepant in the proportional distance of the step phase to the total distance jumped (20% vs. 29% found in the literature). The shortened step phase appeared to be due primarily to a high trajectory of the body during the hop phase, making it difficult for the S to conserve horizontal motion throughout the jump. A training program over the next 6 mos. focused primarily on those factors which would reduce the vertical vel. component of the hop phase in order to increase the horizontal and vertical vel. components in the step phase. The purpose of this study was to compare pre and post season kinematic characteristics and relate those characteristics to changes in performance. During the 1984-85 season, the S improved her triple jump record from 11.15 m to 12.78 m. The S was filmed again in April, 1985. The results of the analysis of those data revealed that the improvement in performance could be attributed primarily to those kinematic characteristics which contributed to conserving horizontal motion during the 3 phases of the jump: (1) in taking off (TO) from the hop, the center of gravity (CG) of the body was lower and had moved farther forward of the support foot; (2) in TO from the step, the CG was slightly higher and closer to the support foot; (3) there was an increase in horizontal vel., and a decrease in vertical vel. of the CG at TO from the hop; (4) there was an increase in both horizontal and vertical vel. of the CG at TO from the step; (5) the angle of TO from the hop was lower and from the step was higher and there was a corresponding lowering of the flight path of the CG for the hop and raising for the step; (6) there was an increase in the vel. of the arm segments at TO from the step. The final phase ratio values for the hop, step and jump (31.7%, 27.1%, 41.2%) showed a definite improvement over the preseason ratios (39.5%, 19.7%, 40.8%) and a trend toward those ratios reported in the literature. The kinematic characteristics selected for analysis appeared to indicate a positive trend toward conserving the horizontal motion throughout the 3 phases, particularly in the step phase.

Hashem Kilani
Department of Physical Education
University of Illinois
Urbana, IL 61801

Thursday, April 10
12:15-1:45 p.m.

GAIT CHARACTERISTICS ASSOCIATED WITH EXCESS REAR-FOOT MOTION IN FEMALE RUNNERS.

C.J. Bowers, C. Armstrong, G. Gray, P. Spyropoulos, T. Levendusky, Department of Health Promotion & Human Performance - Applied Biomechanics Laboratory, University of Toledo, Toledo, Ohio 43606.

Of the many functional abnormalities in the lower extremity associated with running injuries, none has receiver greater attention than that involving excessive rear-foot motion. This is due to the fact that the involved structure (sub-talar joint), and the associated motions (pronation and supination), play a critical role in both force dissipation and application. In spite of this, there is relatively little data regarding the gait characteristics of those who present excessive sub-talar range of motion (ROM). Such information may have application in identifying those individuals who are at risk of developing running-related injuries, and in the prevention and treatment of such injuries. Thus, the purpose of this study was to compare individuals demonstrating normal sub-talar alignment with those who evidenced abnormal alignment, on the basis of selected characteristics of running gait.

Two groups of female runners (total N=18), representing the two conditions, were selected. The subjects were acclimated to treadmill running, and then evaluated during three testing runs (pace=9 min-mile) with cinematography (200 fps) and electrodynography (200 sps). The data was smoothed, and then statistically analyzed to provide a comparison between the two groups, and to examine correlations between selected kinematic and kinetic variables.

The results indicated subtle but important differences between the two groups in a number of variables. While the rear-foot angle at initial contact was similar for the two groups, they differed in total ROM, ROM from sub-talar neutral, ROM from relaxed stance, and pronation velocity. Additionally, static pronation was found to be a poor predictor of dynamic pronation. The electrodynogram data indicated abnormalities in the pattern, duration, and intensity of ground reaction forces in the abnormal subjects that may be linked to excessive ROM. Collectively, the data provide an indication of the mechanisms by which excess rear-foot motion may indice the micro-trauma associated with injury.

Cynthia J. Bowers
Dept. of PE & Athletics
Ferris State College
Big Rapids, MI 49307

Thursday, April 10
12:15-1:45 p.m.

ISOKINETIC STRENGTH CHARACTERISTICS OF COLLEGIATE TRACK AND FIELD ATHLETES.

Philip K. Schot and Kathleen M. Knutzen, Western Washington University.

The purpose of this study was to examine the bilateral strength symmetry and agonist/antagonist strength relationships in collegiate track and field athletes. Twenty volunteers (13 males, 7 females, ages 18 to 23) who were active participants on an NAIA track team served as subjects. The subjects represented the following events: hurdling, sprints, jumps, throws, and middle distances. Testing was done immediately following the competitive season. Strength values were obtained isokinetically (120 degrees/second) for ten joint movements; plantar flexion, dorsiflexion, knee flexion/extension, hip flexion/extension, shoulder flexion/extension, and elbow flexion/extension. The order of testing was randomized. A Cybex Orthotron II isokinetic dynomometer retrofitted with the Isotechnology Isoscan system and interfaced with an Apple IIe microcomputer was utilized to collect the data. Isoscan software was employed in the sampling of the data (200 Hertz) and in the analysis of the torque curves. The system was calibrated prior to each data collection. Maximum torque values were normalized with respect to body weight. Flexion to extension ratios were computed for each movement. A MANOVA with repeated measures was applied to assess differences between events and trials. There were no significant agonist/antagonist differences between the events, but there was a significant trial effect ($p<.05$). Univariate results demonstrated that plantar flexion, knee extension, hip extension, and shoulder extension were significantly stronger than the antagonistic movements for both the right and left sides ($p<.05$). Left side elbow extension torque values were also significantly greater than left elbow flexion; however, the right elbow flexion and extension torques were not significantly different. The comparison of the right and left strength ratios revealed no significant differences between the events or across the trials. The results of this study indicate the presence of agonist/antagonist muscular imbalance and a condition of bilateral symmetry in track and field athletes.

Philip K. Schot
Department of Physical Education
Western Washington University
Bellingham, WA 98225

Thursday, April 10
12:15-1:45 p.m.

THREE-DIMENSIONAL KINEMATICS OF THE THROWING ARM DURING A BASEBALL PITCH.

Michael E. Feltner, Indiana University.

The baseball pitch has been one of the most analyzed actions in sports biomechanics. However, very little is known about its 3-dimensional (3D) mechanical aspects. The purpose of this study was to analyze the kinematics of the throwing arm during baseball pitching. Four male intercollegiate varsity baseball pitchers were filmed using the DLT method of 3D cinematography. Standard film analysis procedures were used to digitize the projected film images and to obtain 3D coordinate data for the relevant body landmarks. Vector algebra procedures were then used to calculate the three angles (abduction/adduction, horizontal abduction/adduction, and internal/external rotation) defining the position of the upper arm relative to the trunk, and the elbow flexion/extension angle. Examination of the various plots of these four angles versus time led to the following general conclusions for all subjects. After the ball left the glove until the instant of stride foot contact, the upper arm was simultaneously horizontally abducted, abducted, and slightly externally rotated. These actions continued until the upper arm reached a position of approximately 40° of horizontal abduction (relative to the shoulder axis) and 90° abduction, with the forearm pointing forward. The elbow joint was flexed to approximately 100° at this instant (180° = full extension). The elbow joint then remained stationary in this position relative to the shoulder joint, while the motion of external rotation of the upper arm continued. Once the forearm reached a position pointing slightly past vertical, the upper arm continued to externally rotate, and it began to abduct and to horizontally adduct. This movement continued until approximately 20 ms prior to ball release, when the position of maximum external rotation was reached (mean = 105°, relative to the longitudinal axis of the trunk). From this position, the upper arm continued to horizontally adduct and it began to adduct prior to ball release. The elbow joint began a rapid extension in the final 50 ms prior to ball release, reaching values within 25° of full extension at the instant of ball release. The three most striking findings of this study were: (A) that the elbow joint remained stationary relative to the shoulder joint, while external rotation of the upper arm changed the forearm position from pointing forward to pointing slightly past vertical; (B) that the upper arm reached the position of maximum external rotation only 20 ms prior to ball release; and (C) that while the upper arm was internally rotating at the instant of ball release, it was still in an externally rotated position at that instant.

Michael E. Feltner
Indiana University
Department of Physical Education
HPER 112
Bloomington, Indiana 47405

Thursday, April 10
12:15-1:45 p.m.

KINEMATIC ANALYSIS OF FREE HIP CIRCLES. F.Victor Harding, California State University Fullerton; and Mark D. Grabiner, University of Southern California.

The purpose of this study was to determine kinematic variables that contributed to skilled performance of free hip circles by female gymnasts. The athletes initiated the movement from a cast position above the bar and ended in a handstand above the bar. High speed cinematography (98 fps) was implemented to record eight trials of three highly-skilled female college gymnasts. The trials were judged by the athletes' coach and peers ranging from fair to very good. Variables utilized in the analysis included time histories of the shoulder and hip angles and the path of the whole body center of gravity for the entire movement. Results indicate the better performances were characterized by shoulder and hip angles for the first 1/2 of the movement from 108° to 29° and 166° to 107° respectively. The shoulder and hip angles progressively increased throughout the remainder of the movement as the hips extended and the shoulders flexed. These data illustrate an interaction between hip extension, shoulder flexion, and the timing of these joint movements to increase the angular velocity of the center of mass during the mid-range of the movement so that the negative effects of the longer lever and the loss of energy due to friction of the body's center of gravity in the final 1/2 of the movement could be overcome. The athlete's center of gravity remained farther from the bar during the last half of the movement in the better trials.

Thursday, April 10
12:15-1:45 p.m.

F. Victor Harding
Department of HPER
California State University Fullerton
Fullerton, CA 92634

A KINEMATIC ANALYSIS OF THE BASKETBALL FREE THROW AS PERFORMED BY 13 SEVENTH GRADE BOYS.

Miriam N. Satern, University of North Carolina at Greensboro; Stephen P. Messier, Wake Forest University

The purpose of this study was to analyze the mechanics of the basketball free throw as performed by seventh grade boys. A second purpose was to compare the results of this analysis to the results of analyses that had been performed on adults, as reported in the literature, and to provide the bases for future such comparisons if like data on adults were not available. Two LoCam cameras, each operating at a film transport speed of 100 fps, provided simultaneous, non-synchronous sagittal and frontal views of repeated trials for 13 right-handed subjects. Two successful trials per subject were digitized using a Numonics digitizer interfaced to an Apple II+ microcomputer. Analysis of the performance variables revealed: (a) a mean projection angle of $50.48^\circ \pm 6.80^\circ$, (b) a mean projection velocity of 7.00 ± 0.71 m·sec^{-1}, and (c) a significant correlation between the angle of projection and the subjects' height ($r=-.66$, $p=.01$). Additionally, analysis of the process variables revealed: (a) the mean center of gravity was displaced horizontally 19 cm and vertically 33 cm during the execution of the free throw, (b) the mean values for the angle of trunk inclination showed the trunk initially flexed, then extended to an almost vertical position .04 seconds prior to release, and then flexed again to a position of $+.02 \pm .07$ radians at release, (c) the peak mean wrist velocity of 23.03 ± 7.59 rad·sec^{-1} occurred .02 seconds prior to ball release and decelerated through release, and (d) the timing and coordination of the mean joint angles of the upper and lower body showed a sequence of actions occurring; it began with the knees extending .24 seconds prior to release, followed by the right shoulder, elbow, and wrist flexing, extending, and flexing .16, .12, and .04 seconds, respectively, prior to release. The performance parameters of mean projection angle and mean projection velocity were similar to reported results of adult women on the basketball free throw (Hudson, 1985). The similarity in the performance parameters was not unexpected as the same product, a successful basket, had been achieved by both sets of performers. Comparison of the process parameters between the two sets of performers could not be made, however, as like data on the adult performers were not available in the literature. The results of this study, therefore, provide process parameters that can be used in future investigations into whether or not the kinematic process parameters used by young performers to achieve a successful free throw are similar to those used by adult performers.

Miriam N. Satern
211 Forney
University of North Carolina at
Greensboro
Greensboro, NC 27412

Thursday, April 10
12:15-1:45 p.m.

THE BIOMECHANICAL SUPPORT OF EIGHT SELECTED SPORTS BRAS FOR SMALL, MEDIUM AND LARGE BREASTED WOMEN WHILE JOGGING

Authors: Deana Lorentzen: Utah State University
LaJean Lawson: University of Nevada/Reno

This study compared the biomechanical support offered by eight presently marketed sports bras for small, medium, and large breasted women while jogging. Sixty subjects (15 A, B, C, & D bra size groups) were filmed while jogging on a treadmill at 6 mph in each of the bras and in the nude condition. The vertical displacement of the breast relative to the body during one average running stride was calculated for each condition. An ANOVA and pairwise difference procedures revealed significant ($p<.05$) differences between the D cup size group and each of the remaining three cup size groups in the nude condition. In addition a two-way repeated measure ANCOVA (using the mean displacement in the nude for each group as the co-variate) indicated significant pairwise differences among the bras: both within each cup size group, and within the group as a whole. Implications for future biomechanical breast research and sports bra design were dissussed.

Deana Lorentzen
Dept HYPER UMC 70
U.S.U.
Logan, Utah 84321

Thursday, April 10
12:15-1:45 p.m.

BIOMECHANICAL CORRELATES TO PSYCHOLOGICAL MEASURES OF STATE ANXIETY DURING STRESSFUL MOTOR TASK PERFORMANCE. Mark D. Grabiner, University of Southern California; John L. Callaghan, University of Southern California.

The purpose of this investigation was to determine, via an interdisciplinary approach, the changes in kinematics associated with an acquired motor skill as a function of skill level, perferred limb, and state anxiety. College-aged combatives practioners, classified as novice, intermediate, and expert, were filmed at 60 frames/s as they performed a fundamental sagittal plane strike that required participation by the shoulder complex, elbow, and radioulnar joints. Trials of both the preferred and nonpreferred limbs were recorded for strikes against zero resistance. In the second, anxiety-related condition, the subjects were required to strike, in an effort to break, a special polyurathane apparatus whose loading-failure characteristics simulate the wood generally practiced upon by these practioners. Prior to filming, Cooper Smith's Self Esteem Inventory and Speilberger's A-State A-Trait Anxiety test were administered. As expected, the higher skilled subjects demonstrated lower values of state anxiety coupled with higher values of self-esteem. Kinematic analysis of the task, however, demonstrated a surprisingly greater corruption of technique with greater skill level. Indeed, failure to break on the initial attempt generally resulted in further disruption of technique in the second trial. The results are consistent with the large body of literature regarding arousal and (product) performance, as well as an emerging body of literature regarding arousal and (process) performance. There are broad implications for a variety of specialized athletic activities especially in the area of psychological training/preparation.

Mark D. Grabiner
Department of Physical Education
University of Southern California
Los Angeles, CA 90089-0652

Thursday, April 10
12:15-1:45 p.m.

EXTRA-CURRICULAR SPORT FOR HIGH SCHOOL GIRLS IN THE 1920s: THE IMPACT OF THE WOMEN'S DIVISION-N.A.A.F. ON LOCAL PROGRAMS IN CALIFORNIA. Roberta J. Park, University of California, Berkeley.

Several studies have investigated the activities of the Women's Division of the National Amateur Athletic Federation and its role in developing a new "philosophy" and form of extra-curricular sport for girls and women in the 1920s, but few have examined its influence upon local high schools. The present study investigates extra-curricular sports for high school girls in the State of California from 1918 to 1928. It draws upon: the official records of the California State Department of Education; G.A.A. Constitutions and Handbooks of more than fifty California high schools; the personal files of the California Assistant State Supervisor of Physical Education for Girls; school annuals; and local newspapers. California established the nation's second State Bureau of Physical Education in 1918, selecting as Supervisor Clark W. Hetherington, a man who had already gained a reputation as a staunch advocate of "educational" athletics. Hetherington chose as his Assistant Winifred Van Hagen, a graduate of the Boston Normal School of Gymnastics. Well before the important 1923 and 1924 meetings of the Women's Division, the two had worked together to foster the idea of "playday" activities for California's school-aged population. The formation of the Women's Division-N.A.A.F. provided the stimulus which rapidly advanced the type of work which they had already begun. By 1926, California high school faculty and students were busy writing G.A.A. Constitutions and developing extensive afterschool sports programs based upon the "playday" concept. Although there were local differences, the constitutions reflected a remarkable similarity. The most frequently-stated objectives were "school spirit" and "good sportsmanship." Although "health" of the individual participant was deemed an important program goal, the emphasis was clearly on personal and social adjustment. The Assistant State Supervisor of Physical Education for Girls and faculty of Departments of Physical Education for Women at the State's various universities and colleges were important in making the "playday" the dominant form of girls' extra-curricular sport in California high schools in the 1920s.

Roberta J. Park
Department of Physical Education
200 Hearst Gymnasium
University of California
Berkeley, California 94720

Friday, April 11
12:15-1:45 p.m.

ELEMENTARY, JUNIOR AND SENIOR HIGH STUDENT ATTITUDES TOWARD FEMALE PARTICIPATION IN SPORT.

Marcie Beckman Hagge, Purdue University.

The purpose of this study was to determine students' attitudes toward females' participation in sport and whether these attitudes varied by gender, grade and attitudes toward the role of women in society. A questionnaire was administered to 554 subjects in a rural community to students in grades five, seven, nine and eleven. Subjects were asked to indicate the extent to which they agreed with the statements regarding attitudes toward girls' and women's participation in sport. Results indicated that the subjects were generally positive in their attitudes toward females in sport. Gender was significantly related to attitudes toward female participation, with girls indicating a more positive attitude. No significant difference was found by grade. In addition, based on questions related to students' attitudes toward the role of women in society, students were characterized and grouped as contemporary, moderately contemporary or traditional. These groupings revealed that attitudes were significantly more positive toward female sport participation in the contemporary group than the moderately contemporary or traditional groups. Results may indicate not only a trend toward more positive student attitudes toward women in sport, but also that students' attitudes toward the role of women in society are linked to attitudes regarding females in sport. It may be that as attitudes toward women in society become more contemporary, so too will their views of women in sport.

Marcie Beckman Hagge
Department of Physical Education
Purdue University
West Lafayette, IN 47907

Friday, April 11
12:15-1:45 p.m.

INVESTIGATION OF WITHIN SPORT EXPERIENCES AND INCENTIVES FOR CONTINUED PARTICIPATION IN WOMEN'S CLUB FIELD HOCKEY.

Wanda K. Green, University of Northern Iowa.

The purpose of this study was to determine if the importance of selected incentives for continued involvement differed between groups based on selection status, role of involvement, or length of membership within organized field hockey. Each of the seven selected incentives represented specific situations within the field hockey environment which could function as rewards, gratifications, or sanctions (obligations) leading to continued involvement. Situations were categorized by logical relationship into game, social, skill, reward, organization, sanction, and resource incentives. Selection status, roles of involvement, and years of membership were the involvement experiences used to identify comparison sub-groups. A questionnaire was administered to 108 women field hockey association members from seven geographic sections of the U.S. A 7-point scale was used to assess the perceived importance of specific incentive situations to continued involvement for the current season. Incentive means for each sub-group were placed in rank order to compare the relative pattern of importance of incentives. One-way ANOVA was used to statistically compare sub-groups within each involvement variable for each of the seven incentives. Scheffe multiple comparison tests were used for all three-group post hoc analyses. Rank order of incentive means for each sub-group indicated very similar rankings by all groups. The four most important incentives were: skill, game, social, and resource incentives. Some variation in ranking occurred within the remaining three incentives. Selection groups differed significantly on three incentives: social, skill, and reward. All three were significantly more important to the selected group than at least one of the two other groups. Player only and multiple role groups differed significantly on two incentives: organization and sanctions. Both incentives were more important to the multiple role group. Groups based on years of membership differed on only one incentive. The 5-9 year group indicated skill incentives were more important than to the 10-year-plus group. In conclusion, incentives for continued involvement tended to be similar for all players. However, the degree of importance of those incentives differed with involvement experiences based on selection and roles.

Wanda K. Green
Department of Physical Education
University of Northern Iowa
Cedar Falls, IA 50613

Friday, April 11
12:15-1:45 p.m.

IMPACT OF ATHLETIC SCHOLARSHIPS ON THE MOTIVATION AND COMMITMENT OF FEMALE INTERCOLLEGIATE ATHLETES.

Elaine M. Blinde, University of Illinois.

Several researchers (Ryan, 1980; Sack & Thiel, 1985) have suggested that athletic scholarships possess the capability of altering the sport experience for athletes in that scholarships: (1) introduce the notion of "play for pay", thereby undermining the intrinsic motivation of athletes in the sport activity, and (2) require greater commitment and sacrifices by athletes in order to maintain their eligibility for such financial aid. Given the fact that athletic scholarships represent a recent phenomenon in women's intercollegiate sport, research examining the impact of athletic scholarships on the motivation and commitment of female intercollegiate athletes has been limited. Therefore, the purpose of this study was to examine the possible impact, if any, that athletic scholarships have had on the motivational and commitment dimensions of the intercollegiate sport experience of female athletes. Data were obtained by means of a mailed questionnaire from 231 former female athletes in the Big Ten Conference who had participated in a variety of sport programs from 1978 to 1983. The sample was divided into two groups consisting of scholarship holders (n=115) and non-scholarship holders (n=116). Scholarship and non-scholarship athletes were found to differ significantly in terms of their motives for college sport participation, sport role commitment during college, and perceptions of the sacrifices required by sport participation. In particular, scholarship athletes were more likely than non-scholarship athletes to (1) emphasize the extrinsic components of sport participation, (2) possess greater commitment to the role of athlete, and (3) report that college sport participation forced them to sacrifice other aspects of their college life (e.g., schoolwork, social life, other activities). Given the fact that the desirability of awarding athletic scholarships to amateur athletes in educational institutions has become an issue of tremendous debate in recent years, this study provided evidence of both the possible positive and negative consequences of athletic scholarships for female athletes.

Elaine M. Blinde
1 C.R.C. - Motor Behavior Lab
51 Gerty Drive
University of Illinois
Champaign, IL 61820

Friday, April 11
12:15-1:45 p.m.

THE EFFECTS OF DIFFERENT BENCH HEIGHTS ON VERTICAL JUMP PERFORMANCE OF COLLEGE WOMEN DURING PLYOMETRIC TRAINING. Linda Stonecipher, Skidmore College.

The purpose of this study was to determine if females, jumping from an elevation of 70 centimeters during plyometric training, could develop greater stored energy resulting in a greater gain in vertical jump performance than females jumping from an elevation of 43 centimeters. Fourteen female college students on the varsity volleyball team were randomly divided into two groups. Both groups were pretested on vertical jump performance. During the first two weeks of the 10 week training period, one group (high jump) jumped from a height of 70 centimeters, landed on a one inch mat, and immediately rebounded with a maximal effort. The training session involved three sets of 10 jumps with three sessions per week. The protocol was identical for the second group (low jump) except the jumping height was 43 centimeters. During the final eight weeks, both groups performed three sets of 20 jumps, three times per week. At the conclusion of the training period, both groups were retested on vertical jump performance. The difference between each subject's pretest and posttest scores was determined, and the mean difference was calculated for each group. The Student's t test was used to determine the difference between groups. Results indicated that there was no significant difference in vertical jump scores between the high jump and the low jump group ($p > .05$). A paired t test was used to determine the difference between the mean difference of each subject's pretest and posttest scores for each group. Both groups displayed a significant increase in vertical jump scores: low jump (1.50 ± 1.0 inches; $p < .05$), high jump (1.57 ± 0.53 inches; $p < .05$). The results of this study suggest that female college students can significantly increase their vertical jump performance utilizing the plyometric training technique of depth jumps from heights of either 70 or 43 centimeters. This is in contrast with data from experiments which utilized male subjects who displayed more gain in vertical jump performance when training involved jumps from a high platform compared to a low platform. This apparent sexual dimorphism needs further investigation. However, this study provides support for utilizing depth jump training to increase vertical jump performance of college women.

Linda Stonecipher
Department of Physical Education
Skidmore College
Saratoga Springs, NY 12866

Friday, April 11
12:15-1:45 p.m.

EFFECT OF SHORT-TERM HIGH-INTENSITY EXERCISE ON ANAEROBIC THRESHOLD IN WOMEN.

Blanche W. Evans, Drake University, Des Moines, Iowa 50311

The purpose of this study was to investigate the effects of a six-week, high-intensity cycling program on "anaerobic threshold" (AT) in women. Ten women were randomly assigned to a control or exercise group. Women in the exercise group trained four days/week using high-intensity, interval-type cycle exercise. Workouts included six, four-minute intervals cycling at 85% $\dot{V}O_2$ max, separated by three-minute intervals of lower intensity cycling at 25% $\dot{V}O_2$ max. Maximal oxygen uptake and anaerobic threshold were assessed prior to and immediately following the six-week program. VO_2 max was reassessed weekly in the exercise group. AT was determined non-invasively as the point of an increase in VE/VO_2 without an increase in VE/VCO_2. No significant group, test or group X test interaction ($p > .05$) was found for $\dot{V}O_2$ max in $l \cdot min^{-1}$ or $ml \cdot Kg^{-1} \cdot min^{-1}$. A significant interaction effect was found for cycle ride time and for AT expressed in liters, milliliters, work rate and as a percentage of max ($p < .05$). Further analysis of the significant interaction effects revealed no significant pretest to posttest differences in any variable in the control group, while the exercise group showed significant differences in these variables from pretest to posttest. It was concluded that, in women, short term, high-intensity cycling exercise significantly increases physical work capacity (cycle ride time) and AT measures without substantial changes in $\dot{V}O_2$ max parameters.

Dr. Blanche Evans
Bell Center
Drake University
Des Moines, Iowa 50311

Friday, April 11
12:15-1:45 p.m.

MOTOR PERFORMANCE OF WOMEN AS A FUNCTION OF AGE AND PHYSICAL ACTIVITY LEVEL. Roberta E. Rikli, California State University, Fullerton; and Sharman L. Busch, Saddleback Valley Vascular Institute, Laguna Hills, California.

The primary purpose of this investigation was to study the effects of lifelong activity patterns of older women relative to reaction time, balance, flexibility, and strength. The study employed a young/old, active/inactive cross-sectional design, identical to that used by Spirduso (1975) in a similar study using only male subjects. Subjects were 60 female volunteers, classified into one of the following four groups of 15 subjects each: (1) young active (M=22.2 yrs. of age); (2) young inactive (M=21.1 yrs.); (3) old active (M=68.7 yrs.); and (4) old inactive (M=68.9 yrs.). Active subjects were those who had participated in aerobic-type activities on a regular basis (at least 3 times a week) for the past 10-15 years for older subjects and 3-5 years for younger subjects. Inactive subjects were women who had never participated in vigorous physical activity of any type on a regular basis. All subjects were tested for simple and choice reaction time, stationary balance, sit and reach flexibility, shoulder flexibility, and grip strength. Data were analyzed by a 2x2 ANOVA. Significant interactions were analyzed by a simple effects analysis of variance. On all variables, except for grip strength, performances of the women in this study were similar to those of male subjects in previous studies in that scores of active older subjects were very similar to active college-age subjects and significantly better than those of their inactive older peers ($p < .01$). Results suggest that a chronically active lifestyle plays an important role in preventing or at least delaying the usual age-related declines in motor performance. While definite causation cannot be inferred from a cross-sectional design such as this, a comparison of these results with recent findings from similar "true" experimental research on animals suggests that a causal interpretation is probably warranted.

Roberta E. Rikli
Department of Physical Education
California State University,
Fullerton
Fullerton, CA 92634

Friday, April 11
12:15-1:45 p.m.

EFFECT OF THREE LEVELS OF PHYSICAL ACTIVITY UPON CARDIOVASCULAR FUNCTION IN 84 FEMALES, AGED 50-70 YEARS.

Joyce E. Ballard, University of Texas at Tyler; Barry McKeown, University of Texas at Arlington; Helen Graham; Tyler, Texas; Stephen Zinkgraf, University of Texas Health Center at Tyler.

The purposes of this study were to investigate in females 50-70 years: 1) the effect of 3 levels of exercise participation (high exercise, HE; moderate exercise, ME; and little or no exercise, LE) upon cardiovascular function (HR, SBP, DBP) and 2) the approximate level of exercise necessary to produce desired cardiovascular changes. Ss for this study were 84 female volunteers, 50-70 years ($\bar{X}$ Age=57.4$\pm$5.4) who were physician screened to ascertain cardiovascular health. All Ss completed an activity questionnaire in which they indicated: 1) regular exercise of 3 or more times/week for 40 minutes or longer/session (HE); 2) sporadic exercise of fewer than 3 days/week, or for shorter periods of time (ME); or 3) little or no exercise (LE). Also, Ss completed a sub-maximal (85% of age determined HR) graded exercise test (Balke protocol). Ss were classified into 3 exercise groups based upon activity history and predicted maximal MET capacity from the treadmill test as follows: (HE, n=35, $\bar{X}$ Age=56.4, $>$8.5 METS; ME, n=21, $\bar{X}$ Age=57.1, 6-8.4 METS; and LE, n=28, $\bar{X}$ Age=59.4, $<$6 METS). Pre-exercise HR and BP were obtained. During the TM test, HR was obtained each minute, blood pressure was obtained by auscultation every 2 minutes. One-way ANOVAs performed on values for pre-exercise and minutes 2,4,6, and 8 of the TM test between the 3 exercise groups with respect to HR, SBP, and DBP revealed that HE had significantly ($p \leq .05$) lower HRs, SBPs, and DBPs than LE for pre-exercise and for all minutes of the test (2,4,6, and 8). There were no significant differences in HRs between HE and ME although ME produced significantly lower HRs than LE for minutes 2,6, and 8. ME was significantly lower than LE for DBP4, SBP6, and SBP8. One-way ANOVAs were used each minute due to the changing number of subjects who completed each workload. On the basis of these data, it was concluded that: 1) HE produced improved cardiovascular function over LE, 2) ME was not consistently better than LE, and 3) the approximate level of physical work capacity needed for consistent cardiovascular improvement in these females was a physical work capacity of 8.5 METS or greater. Supported by University of Texas at Tyler Faculty Research Grant #86.

Joyce E. Ballard, Ph.D.
University of Texas at Tyler
3900 University Blvd
Tyler, Texas 75701

Friday, April 11
12:15-1:45 p.m.

THE EFFECTS OF AGE ON PHYSIOLOGICAL RESPONSES TO A TRAINING AND DETRAINING PROGRAM IN FEMALES AGES 20-63 YRS. Beth S. Rosenberg, Peggy A. Richardson, Allen Jackson, North Texas State University.

There is exhaustive evidence in support of favorable cardiovascular changes resultant to even brief (6-8 wks.) aerobic training programs in females (Drinkwater, 1984). Furthermore, it has been demonstrated that these changes will reverse themselves during periods of detraining in young females (Pederson & Jogensen, 1978). The effect that age has on changes that follow periods of detraining has not been previously delineated. Therefore, the purpose of this study was to examine detraining effects on weight (WT), resting heart rate (RHR), resting systolic and diastolic blood pressures (RSBP & RDBP), quadriceps and hamstring strength (QSTR & HSTR) via Orthotron Apparatus, muscular endurance (END) and time to 75% of actual maximum heart rate (T75MAX) during a modified Balke Treadmill test in 30 females over two age cycles (20-39 yrs., $\bar{x}=32.00$ and 40-63 yrs., $\bar{x}=49.11$). Subjects were sedentary prior to undergoing a seven week walk/jog training program, followed by a seven week detraining period. All dependent variables except for QSTR, HSTR and END were evaluated five times: T1 (pre-training), T2 (mid-training), T3 (post-training), T4 (mid-detraining) and T5 (post-detraining). QSTR, HSTR and END were evaluated at T1, T3 and T5. Data were analyzed by a 2X5 or 2X3 (Age Group X Test) ANOVA with repeated measures over the Test factor. The results demonstrated significant Age and Test effects for RSBP and T75MAX as well as a significant interaction effect on RSBP. The other dependent variables failed to demonstrate significant differences. The table below summarizes the results for RSBP and T75MAX by Age Group and Test.

GROUP	VARIABLE	T1		T2		T3		T4		T5		
< 40	RSBP (mmhg)	114	(**)	114	(NS)	115	(NS)	115	(NS)	114	(NS)	(NS)
> 40	RSBP (mmhg)	127		118		121		114		117		(NS)
< 40	T75MAX (min.)	2.43	(**)	3.68	(*)	3.87	(*)	4.47	(*)	4.13	(*)	(*)
> 40	T75MAX (min.)	0.51		2.02		1.87		2.24		1.50		(*)

Based on these results the following conclusions were reached: (1) time to reach a submaximal predetermined heart rate increases with training in a similar pattern across the age ranges studied, however age appears to affect changes during detraining, and (2) younger females demonstrate virtually no changes in resting systolic blood pressure with training or detraining, while older women demonstrate decreases with training which are apparently maintained during a seven week detraining period.

Beth S. Rosenberg, Ed.D.
Division of Physical Education
North Texas State University
Post Office Box 13857
Denton, TX 76203-3857

Friday, April 11
12:15-1:45 p.m.

Relationship of Recreation Participation Barriers To Employment Status and Life Cycle Stage. Lawrence R. Allen, Temple University; Pat Long, University of Colorado.

Barriers to recreation participation have received increased attention in recent years. Not only are recreation departments generally being scrutinized more in their performance but there is a growing awareness that there is a significant number of recreation enthusiasts who are not achieving a desired level of participation. The relative importance of various barriers has been clarified from a generalized perspective but there still remains a need to identify those life factors which affect one's barrier profile. Therefore, the purpose of this study was to determine the impact of one's employment status and family life-cycle stage on one's perception of barriers to recreation participation. A comprehensive questionnaire relating to household recreation behavior was randomly distributed to an adult household member in 31 Colorado communities. 1530 usable questionnaires were returned representing a response rate above 65%. ANOVA was used to determine the effects of employment status and family life cycle stage on one's perception of recreation barriers. The four employment status categories were: full-time employed, unemployed, homemaker and retired. There were nine family life cycle stages; the category of single was added to the eight stages established by DuVall, (1977). The eight stages ranged from married couple without children to retired couple with all children gone from the home and at least one parent retired or deceased. The ten barriers included: not enough time, cost too much, facilities not available, facilities too far, do not feel safe, poor health, no one to go with, don't know where to go, lack of transportation, household doesn't like me to participate. The results revealed that both employment status and life cycle stage have a significant effect on one's perception of barriers to recreation participation. There were significant differences found among eight of the ten barriers as they relate to employment status. Only "cost too much" and "facilities too far" were found not to be significantly different for the four employment categories. Seven of the ten barriers were significantly different across the nine life cycle stages. "Don't know where to go," lack of transportation," and "household doesn't like me to participate" were the three barriers not significantly affected by one's life cycle stage. The implications of these findings will be discussed in greater detail during the presentation.

Lawrence R. Allen, Dept. of
Recreation and Leisure Studies,
Temple University, Philadelphia,
PA 19122

Friday, April 11
12:15-1:45 p.m.

MISSION AND PRACTICE AMONG YMCA'S AND LOCAL GOVERNMENT RECREATION AND PARK AGENCIES IN ILLINOIS: A COMPARATIVE ANALYSIS. Bernard N. DiGrino, Iowa State University; Carlton F. Yoshioka, Iowa State University.

The purpose of this study was to determine if YMCA and local government recreation and park departments differ from one another in respect to organizational and actual practice. Their propensity for maintaining consistency between stated mission and actual practice was also determined. A mailed questionnaire was sent to all Illinois YMCA's and local government recreation and park agencies, employing one or more full-time employees with major responsibilities in the area of recreation services. Forty three of 79 YMCAs elected to participate, while 156 of 227 local government agencies provided usable responses. Chief executive officers for each of the organizations were asked to rate the relative importance of their organization's purposes and actual practices on a 0-10 point scale. Considerable support exists for the contention that perceptions of organizational executives are the most valid indicators of their agencies' goals. Ratings were based on a three dimensional construct, designed for assessment of organizational purpose. The three purposes are: increased ratio of revenue to expense, compliance with public or market wants, and enhancement of human/environmental well-being. A series of t-tests were employed to address the presence of variation between organization types and between mission and actual practice ratings. Local government agencies and YMCAs identified the mission "enhancement of human/environmental well-being" as important, however, both organization types reported significantly lower ratings in actual practice. Both organization types emphasized "increased ratio of revenue to expense" significantly more in actual practice than in their statements of mission. Such was not the case relative to the purpose of "compliance with public or market wants". Mean mission and actual practice ratings for the purpose of "increased ratio of revenue to expense" were significantly higher for YMCAs. Revenue generation and cost containment, while not the primary mission of either organization, appears to be of growing concern. From administrative and program perspectives, emphasis on revenue generation and operating efficiencies can be complementary to the organization's primary purpose. Expanded fiscal resources can be earmarked for client services. Unfortunately, the administrative focus can result in market segmentation and demand-oriented programming and pricing strategies that exclude participants with the greatest need.

Bernard N. DiGrino
Department of Physical Education and
Leisure Studies
Iowa State University
Ames, Iowa 50011

Friday, April 11
12:15-1:45 p.m.

VANDALISM AND DEPRECIATIVE BEHAVIOR AT SELECTED STATE PARKS AND RECREATION AREAS. Henry A. Eisenhart, University of Oklahoma.

The purpose of this investigation was to determine the amount of vandalism, measured in incidences and cost, and the kinds of vandalous and depreciative acts that occurred during one fiscal year in selected Oklahoma State Parks and Recreation areas. Sixty state parks and recreation areas were selected based on statewide geographic distribution, rural/urban proximity, and recreational opportunity diversity. A survey questionnaire was developed that attempted to ascertain the following information from individual park properties: yearly visitation: time(s) of day and day(s) of the week that vandalism occurs; financial costs of repair/replacement; apprehension and remuneration success rates; availability of security measures; advertising and/or educational programs designed to reduce adverse behavior. The survey was sent to the Park or Area Superintendent of the sixty properties with cover letter from the Director of State Parks encouraging compliance with the study. The survey results identified the time period from 10:00 p.m. to 7:00 a.m. as the period when most vandalism occurs. Saturday and Sunday were the days with the largest incidence of vandalous acts. The average amount of each properties fiscal budget spent on repair/replacement of equipment or facilities was less than 2%. Fourteen percent of the respondents reported apprehending vandals however 78% of those apprehended paid for at least a portion of the damage. Security measures most utilized were security personnel and park closure. Very few parks had any advertising or education programs aimed at reducing vandalism other than conventional interpretive services. Parks with the largest vandalism problems were identified as well as the most frequent and repeated types of depreciative behavior.

Henry A. Eisenhart, Ph.D.
Department of Health, Physical Education and Recreation
University of Oklahoma
Norman, OK 73019

Friday, April 11
12:15-1:45 p.m.

PRODUCTIVITY AND COLLABORATIVE PATTERNS OF PHYSICAL EDUCATORS.

Annelies Knoppers and Jayne Schuiteman, Michigan State University

An indirect measure of the status and acceptance of women in a discipline can be obtained from a study of productivity and of collaboration patterns in research (Mackie, 1977, 1985). The purpose of this study, therefore, was to examine these patterns for female and male physical educators who published in 15 research-based physical education journals 1980-1984. Specifically, the authors focused on overall publication rates, gender of primary authors of mixed teams and of dyads, and size and gender composition of author teams. In addition, a measurement of change was obtained through a comparison of selected data of 1980 and 1984. The total sample consisted of 175 women and 420 men all of whom had served as a primary or secondary author of at least 1 article. A subgroup of primary authors only, consisted of 136 women and 282 men. The results of t tests for independent samples showed that overall women and men had similar publication rates ($p>.05$) and had published a similar number of articles ($p>.05$) as primary authors. Men had published significantly more as secondary authors ($p<.025$). Results of a chi square analysis revealed that type of collaboration differed significantly by gender ($p<.05$). Females tended to publish alone more often or in significantly smaller groups ($p<.01$) than did males. Women were primary authors of 35.46% of mixed teams and of 38.7% of mixed dyads. Longitudinal data indicated that the number of female senior authors of mixed teams and dyads had declined over the five year period. It was concluded that female physical educators lacked access to collegial circles in higher education and that their status in the discipline was low as reflected by their infrequent position as primary author of mixed teams. The results were compared with those in the current literature pertaining to academic women and to colleagueship patterns and discussed in terms of the overall climate facing those in higher education.

Annelies Knoppers
Department of Physical Education
Michigan State University
East Lansing, MI 48823

Friday, April 11
12:15-1:45 p.m.

PROFESSIONALIZATION OF ATTITUDE TOWARD PLAY OF HIGH SCHOOL ATHLETES.

L. Marlene Mawson and Kathryn A. Haynes, University of Kansas.

Professionalization of attitudes toward sport, using the Webb Scale, was assessed of 550 high school sophomore athletes, both boys (52%) and girls (48%), who participated in team sports (55%) and individual sports (44%), from 31 schools classified as large (32%), medium (39%), and small (29%). The purpose of the study was to determine if there were significant differences in play attitudes between the sex of the athletes, the type of sport of the athletes, and/or the athletes' school size. Eight high schools from each of six school classifications in Kansas were randomly drawn as a stratified school sample. High school counselors in 31 of the 48 schools administered the Webb Scale to 20 subjects in their respective schools, five to each sex, in team sports and in individual sports. A 2 (sex) by 2 (sport type) by 3 (school size) factor analysis design was used to determine significant differences at the .05 level. On the Webb Scale, ranging from play orientation (1) to professional orientation (6), high school boys' attitudes were significantly ($p=0.00$) more professionalized ($\bar{X}=3.68$) than girls' attitudes ($\bar{X}=2.99$). Team sport athletes' professionalized attitudes ($\bar{X}=3.33$)were found to be similar ($p=.70$) to individual sports athletes' attitudes ($\bar{X}=3.37$). Likewise, there were no significant differences ($p=.67$) in the professionalized attitudes of the athletes according to school size (large school $\bar{X}=3.44$, medium school $\bar{X}=3.32$, small school $\bar{X}=3.28$). It was concluded that over all, high school athletes' attitudes were evenly balanced between a play orientation and a professionalized orientation; although boys had a more professionalized attitude than did girls. The Webb Scale is based on the premise that as play becomes more formalized, attitudes become more professionalized, that is, the importance of winning supercedes the importance of play. Previous research using the Webb Scale has revealed that attitudes become more professionalized as subjects get older and that males possess more professionalized attitudes than females. It was also speculated from research evidence that intensity of high school athletes' involvement in team sports and in smaller schools could potentially mean that the play attitude of these high school athletes might be more professionalized. The results of this study supported the sex differences previously reported, but the importance of winning as actualized through professionalization of attitude was not found to be different due to type of sport nor to size of school.

L. Marlene Mawson
University of Kansas
Department of Health, Physical
Education & Recreation,
Lawrence, Kansas 66045

Friday, April 11
12:15-1:45 p.m.

PREDICTORS OF EARLY ADOLESCENT DROPOUTS AND PARTICIPANTS OF THE INTERSCHOLASTIC ATHLETIC PROGRAM IN THE COLUMBIA,MISSOURI PUBLIC SCHOOLS.

Barbara H.Logan,Round Rock Independent School District; James D.Brown,University of Missouri-Columbia;Richard M.Hessler, University of Missouri-Columbia.

The purpose of this study was to determine if any of twenty-one demographic,personal attribute, or socialization variables could significantly predict interscholastic athletic participation status of high school sophomores following their junior high school athletic experience in Columbia,Missouri.A questionnaire was administered by high school physical education teachers to high school sophomores who had participated in one interscholastic sport during their junior high school experience in Columbia, Missouri.Three hundred forty-eight or 96.13 percent of the former junior high school interscholastic athletic participants responded to the questionnaire.One hundred forty-five or 46.77 percent were interscholastic athletic dropouts and 163 or 53.23 percent continued to be participants.Twenty-one variables were regressed on participation status using a Logis stepwise regression procedure.The model which best predicted 72.5 percent of all cases included four variables.They were,in order of largest contribution to the model:sex,perceived value of interscholastic athletic participation,previous interscholastic athletic experience,and social network.Twelve other variables correlated significantly with being an interscholastic athletic dropout (p .05).These were: self-perception of both athletic ability and physical build,perceived assessment of athletic ability by parent or guardian,coach, and friends;encouragement to participate in interscholastic athletics from mother or female guardian,father or male guardian, teachers or coaches,and friends;and the influence of the mother or female guardian,teachers or coaches,and friends in the decision-making process.This research concluded there are significant differences between adolescents who decide to drop out of interscholastic athletics after their junior high school experience and those who choose to participate.The results of this study indicate those who drop out tend to be females who have had the opportunity to participate in two or less junior high school interscholastic athletic sport seasons.The tremendously influential social network of the dropout tends to consist of nonparticipants. The activities of the dropout's network tend to be less socially acceptable and potentially more delinquent in nature than those of the participant.

Barbara H. Logan
Department of Physical Education
Round Rock Independent School
Round Rock,TX78664

Friday, April 11
12:15-1:45 p.m.

A Comparative Analysis of Administrative Characteristics and Responsibilities of HPER Administrators. Dr. Harvey White and Dr. James Karabetsos. University of North Dakota.

The purpose of this study was to examine HPER administrators at universities and colleges with enrollments of 10,000 or more students. One hundred and nine males and 27 females participated in this study. Most respondents (81.7%) fell in the range of 40 - 59 years of age. Forty-four percent of the administrators were appointed to their current positions within the past five years and 33% were appointed at 35-39 years of age. Most administrators (53.2% males, 81.5% females) taught physical education at the secondary level. Many administrators did their undergraduate study in HPER (39.7%) or physical education (43.4%) and a majority (65.1% males and 48.1% females) did their doctoral work in physical education. A majority (57.4%) of the administrators had faculties totaling between 10-30. Fifty-one percent of the respondents administered programs with over 200 majors and nearly 25% administered programs with over 4500 students in activity classes. A majority of the males (64%) and females (55%) had release times of 40-80%. A majority of administrators (80%) had teaching responsibilities and more than half taught senior and graduate division courses. Seventy percent of the males and 55.6% of the females taught graduate division courses. A majority of administrators did not have athletic (85%) or IM-Rec. Sports (70%) administrative duties. Seventy-two percent of the males and 48% of females had salaries greater than $40,000. The administrators were asked to rank the following management areas relative to their importance: Public Relations; Personnel Management; Financial Management; Program Management; and Self-Management. Public Relations was ranked as "least important" by 46% of the respondents, whereas Personnel Management was ranked by 60.3% as "most important." Administrators were asked to indicate what percent of time was spent in each of the aforementioned areas. Male (74%) and female (85.3%) administrators spent the least amount of time on Public Relations. Forty-eight percent of the administrators spent 30% or more time on Personnel Managment. Overall, female (51%) and male (30%) administrators spent a large percentage of their time managing personnel. A large number of administrative characteristics were found to be similiar for both male and female administrators. However, further comparative analyses of responsibilities and characteristics identified significant variances in previous teaching experiences, academic preparation, amount of release time and salaries.

Dr. Harvey White
Department of Physical Education
University of North Dakota
Grand Forks, ND 58202

Saturday, April 12
8:15-9:45 a.m.

DANCE/MOVEMENT FOR SPECIAL POPULATIONS: DOCUMENTATION OF THE USE OF THERAPEUTIC DANCE. Boni Boswell; Patricia Fulton, Images in Motion, Inc., Boulder, Colorado

Purpose: To demonstrate the use of dance as a therapeutic and educational experience as well as a performing art for mentally handicapped adults.

Population: Ranging from mildly to severely mentally handicapped, the majority of dancers are moderately mentally retarded. Although differing in behavior and capability, mental ages range from approximately four to seven years.

Program: Choreography of these dances was based on the motoric and social needs of the participants. The objectives underlying the choreography follow the titles of each of the dances listed under rehearsal excerpts.

Rehearsal Excerpts:

I. Shadows - exploration of creative shapes, introduction of one dancer while others are stationery and maintaining shapes, the idea of creating a group shape which presents a novel configuration.

II. Pata pata - Introduction of swinging quality, pivot turning, exploring the idea of partnering through simultaneous movement and through only one dancer moving.

III. Snap, crackle, pop - movement of self through space in relation to others, development of auditory perception through use of auditory cues to signal changing of rhythm and direction of movement.

IV. We are the world - development of solo versus group dance, exploration of personal and environmental space, moving with the purpose of expressing feeling and mirroring sustained movements.

Performance Excerpts:

I. We are the world
II. Pata pata
III. Shadows
IV. Snap, crackle, pop

Conclusion: Mentally handicapped persons have similar needs and characteristics to nonhandicapped persons and given opportunities to advance, they can improve motorically, socially, and demonstrate creativity.

Boni Boswell and Patricia Fulton
Images in Motion, Inc.
Boulder, Colorado

Saturday, April 12
8:15-9:45 a.m.

A NATIONWIDE STUDY TO EXAMINE THE NATURE AND SCOPE OF THE SPORT ARENA MANAGEMENT PROFESSION.

Robert W. Case, Indiana University; Gerald R. Fox, Jr., Tulane University.

In recent years, a number of sport management/sport administration professional preparation programs have been established at colleges and universities located throughout the United States. Many of these programs offer training for possible careers in sport arena management. Unfortunately, little data exists pertaining to the exact nature and scope of the sport arena management profession. The purpose of this study was two-fold. First, to examine the exact nature and scope of the sport arena management profession in terms of field growth and employment opportunities, salary potentials, and education requirements. Second, to identify the specific job performance competencies and related educational course work required to professionally train sport arena managers. A survey instrument was developed and mailed to 189 upper level sport arena managers located throughout the United States. A total of 103 sport arena managers responded to the questionnaire for a 54.5% response rate. The tremendous growth of the arena management profession was reflected in the fact that 71% of the respondents indicated an increase in the total number of sport arena management positions available with their organizations during the past five years. An average of 7 full-time arena managers are presently employed by each organization. Only 35% of the respondents projected a need to hire additional sport arena managers for their organizations over the next five years. The average salary range for entry level positions was listed at $17,360 to $22,880. Middle and upper level management positions were listed at $24,143 to $33,510 and $37,554 to $52,029, respectively. The data revealed that 83% of the respondents hold college degrees (58% bachelors; 25% masters). The most frequently listed undergraduate degree majors were business administration (38%) and physical education and/or recreation (29%). Sport administration (58%) was the most frequently identified degree major at the graduate level. In terms of job performance competencies for entry level positions, supervision, budgeting, scheduling, arena operations, and communication skills were selected as being most important. For middle and upper level sport arena managers, budgeting, supervision, public relations, arena operations, and scheduling were identified as being most important. The development of professional preparation programs specifically designed to train sport arena management personnel was considered an important future need by 92% of the respondents. Communications, accounting, finance, and sport promotions were considered the most important courses to offer.

Robert W. Case
Department of Physical Education
Indiana University
Bloomington, Indiana 47405

Saturday, April 12
8:15-9:45 a.m.

ATHLETIC FUND RAISING PROCEDURES IN NCAA DIVISION I INSTITUTIONS.

L. Marlene Mawson, University of Kansas; Michael L. Boyd, University of Kansas.

Fund raising procedures used by NCAA Division I institutions for funding of revenue sports was sought from athletic directors at the 136 institutions which offer football and basketball programs. The Athletic Fund-Raising Questionnaire (AFRQ) was developed to gather descriptive information on a 15 item self-report scale which included three demographic questions, nine questions related to athletic funding management, and three questions concerning priorities in fund raising procedures. Response percentages were calculated and percentage graphs were constructed to report the fund raising procedures used, and to observe comparisons between eight geographical districts and between six institutional size classifications. Forty graphs were constructed to demonstrate the data findings. Percentage comparisons were considered to be conclusive when differences in response percentages exceeded fifty percent. It was concluded that in more than half of the Division I institutions, the following practices prevailed. The major fund raising techniques used were booster clubs, direct mail marketing, and team concept donations. The advertising techniques used for fund raising were brochures, promotional letters, flyers, schedules, radio advertising, and newspaper advertising. Donors preferred to designate a sport or a general scholarship fund for both men and women athletes. In two-thirds of the NCAA Division I institutions, there were one or more full-time fund raising positions. Seventy percent of the institutions generated up to a fifth of their budget from fund raising efforts, and twenty percent gained nearly a third of their budget from fund raising. Sport revenues from football and basketball, television, concessions, promotional broadcasting, and facilities were determined as other notable sources of income. No consistent patterns of fund raising procedures were inherent within either a district or within an institutional size classification.

L. Marlene Mawson
University of Kansas
Department of Health, Physical Education and Recreation
Lawrence, Kansas 66045

Saturday, April 12
8:15-9:45 a.m.

MANAGEMENT SKILLS ESSENTIAL FOR ADMINISTRATION OF HIGH SCHOOL AND COLLEGE OF PHYSICAL EDUCATION AND ATHLETIC PROGRAMS.

Roxanne Albertson, Jackie Disselkoen, Irma Caton, North Texas State University.

The purpose of this study was to ascertain the relative importance for program success physical education and athletic administrators placed on selected management and personal skills. A second purpose was to determine if differences occurred between perceptions of essential skills by male and female administrators within college, high school, athletic, and physical education groups. A revision of McAda Management Skills Questionnaire was administered to 148 administrators in Texas. Respondents indicated the relative importance of each of 44 statements grouped into 5 management components. The always essential responses were analyzed using %, chi square, and factor analysis. Hypothesis I suggesting the % of N indicating each component as always essential would be greater than the % indicating each component as less essential was partially accepted. Respondents indicated personal motivation was less essential for program success. Within components the greatest item variability among groups occurred with allocating resources, maintaining objectivity, having a dynamic personality, being well groomed, being physically fit, and exercising leadership through influence. Hypothesis II indicating there would be a difference between the always essential scores of M and F administrators within each group was partially accepted. Significant differences between M and F component scores occurred within HA and HPE groups on personal characteristics and groups skills. Within groups W indicated more items essential than M (WC:7; WH:16; WA:12; WPE:9). The greatest variability between M and W responses occurred on laughing at own mistakes (M=44,W-70), being well groomed (M=37;W=74), allocating resources (M=47,W=79), hearing intent of member's statements (M=49,W=70), and exercising leadership through influence (M=43,W=78). These differences between M and F responses suggests M and F administrators do not concur on specific skills for program success. Differences between perceptions of A and PE groups and C and H groups indicate that management skills are job specific rather than generalized to all management levels and areas. Traditionally male identified management skills have provided the model for position evaluation. On the basis of this study it is recommended that composite models be developed combining male and female administrators perceptions of essential skills for each type of management position within physical education and athletics.

Roxanne M. Albertson
Division of Physical Education
Box 13857
North Texas State University
Denton, Texas 76203

Saturday, April 12
8:15-9:45 a.m.

THE PHYSICAL EDUCATION MAJOR PROGRAM - A REVOLVING DOOR? ENTRANCE AND EXIT REQUIREMENTS OF STUDENTS IN THE UNIVERSITY UNDERGRADUATE PHYSICAL EDUCATION PROGRAM.

Joyce Graening, University of Arkansas

The purpose of this study was to examine the current use of entrance and exit requirements for student majors in the university undergraduate physical education program. Questionnaires were sent to 25 major universities located in the Southern District AAHPER states. Results were received from 76% of the respondents which revealed the following entrance requirements for majors: A) In the *fitness/health* area, 11% required a fitness test, 11% had a weight requirement, and 28% required a health exam; B) In the *knowledge* area, 6% required a written exam and 21% had an ACT/SAT requirement; C) In the *skill* area, 11% required passing skill proficiency tests; D) In the *attitude/ personality* area, there were no requirements reported; E) In the area of *GPA's* 61% required a GPA of 2.0-2.49 and 22% had a 2.5-2.99 GPA requirement to enter the major program. The following exit requirements were revealed: A) In the *fitness/health* area, 11% required fitness tests, 11% had a weight requirement, and 16% required a health exam; B) In the *knowledge* area, 17% required a written exam; C) In the *skill* area, 22% required passing skill proficiency tests; D) In the *attitude/personality* area, 1 school required MTAI and CPS Attitude Inventories and semester faculty interviews to assess each student's professionalism; E) 61% of the respondents required a 2.0-2.49 major *GPA* of their graduates, while 33% required a 2.5-2.99 major GPA. 6% had no major GPA requirement for graduation; F) Other exit requirements mentioned by respondents inlcuded completion of state certification exams or NTE; 1 university required 10 hours of voluntary service as a member of a professional organization; and 1 university required a speech/ hearing evaluation. Although many of the universities surveyed had no entrance or exit requirements, 65% felt that some type of major screening program should be used and could be feasible in their school if well designed. The major impediments to conducting a major screening program were the lack of facilities, time consummed in testing, deciding what competencies should be measured and deciding on the performance levels to be mastered.

Joyce Graening
University of Arkansas
HPER 308-Y
Fayetteville, AR 72701

Saturday, April 12
8:15-9:45 a.m.

AN ANALYSIS OF DOCTORAL PROGRAMS IN PHYSICAL EDUCATION. Carl P. Bahneman, West Virginia University.

The purpose of this study was to determine the status of doctoral programs in physical education within the United States. More specifically, admission criteria, methods of student assessment, committee structure, graduate faculty status, and program specializations were examined. A questionnaire was developed by the investigator and piloted using four institutions. All sixty-three institutions identified as offering a doctorate in physical education were included in this study. A return rate of 78% (N=49) was received. In general the data showed that: 1) there was relatively high consistency in the entrance tests used but substantial differences in the criteria levels for acceptance, 2) there were substantial differences in committee structure and the obtaining of graduate faculty status, 3) the number of program specializations often seemed to exceed an optimal balance for the number of available faculty with graduate faculty status, and 4) the criteria for student admission to doctoral study have risen at most institutions during the last five years. With shrinking financial resources available in higher education all academic programs are coming under close scrutiny. Programs are being considered for elimination or reinfusion of additional resources. Excellence seems to be the key determinant in prioritizing programs. It is necessary that physical educators, especially those involved with doctoral programs, gain knowledge and insight into the factors which may affect program excellence and the possible retention or elimination of these programs.

Carl P. Bahneman
School of Physical Education
West Virginia University
Morgantown, WV 26506-6116

Saturday, April 12
8:15-9:45 a.m.

THE EFFECT OF NUMBER OF MOVEMENT COMPONENTS ON RESPONSE TIME IN CHILDREN.

Allen W. Burton, University of Minnesota.

The well-known Fitts' paradigm has been used in developmental studies to provide insight into the effect of age on movement speed, information-processing capacity, and movement control strategies (e.g., Hay, 1981; Sugden, 1980). The purpose of this study was to extend this experimental approach to investigate the effect of age on the ability to integrate simple movements into complex sequences. Seventy-two right-handed males participated in the experiment, 18 in each of four age groupings: 7-, 9-, 11-year olds, and adults. The apparatus consisted of a six-button response board interfaced with an Apple II computer. The buttons were arranged in a reversed-"S" configuration. Each subject performed sequences of two buttons (three different sequences), four buttons (two sequences), and six buttons (only one sequence). The three two-button sequences involved different distances between buttons, thus different indexes of difficulty (IDs). The longer sequences were ordered such that each two-button sequence was performed in three different contexts: (a) by itself, (b) as part of a four-button sequence, and (c) as part of a six-button sequence. Each of the six sequences were performed 13 times for a total of 78 trials. The computer recorded movement time between buttons (MT) and pause time on buttons (PT). There were four independent variables in this study: age, ID, number of buttons in a sequence (NBUT), and position within a sequence The key results for MT were reflected in the lack of an Age x ID interaction for two-button sequences ($p > .30$) and an Age x NBUT x Position interaction ($p < .001$). First, using the reciprocal of the slope across ID (1/b) as an indicator of information-processing capacity (Salmoni & Pascoe, 1979), the absence of an Age x ID interaction for two-button sequences evidenced the lack of age differences in processing capacity on the single-component task. Second, the slopes for MT across NBUT were low and did not differ by age at the first position, suggesting that all subjects were able to preprogram the first portion of the longer button sequences. The slopes remained stable across position for adults, but increased across position at progressively higher rates for subjects of increasing age. This three-way interaction hints that children may require extra processing time as a sequence progresses to "boost" their motor program as it degrades over time. Thus, the decreasing need for additional on-line processing time with increasing age implies that the ability to integrate components of a movement sequence improves with age.

Allen W. Burton
Institute of Child Development
University of Minnesota
Minneapolis, MN 55433

Saturday, April 12
8:15-9:45 a.m.

GROWTH AND ADIPOSITY AMONG MEXICAN-AMERICAN CHILDREN. Robert Guinn, Pan American University.

The purpose of this study was to investigate for changes in growth and adiposity among Mexican-American (M-A) children from 1972 to 1985 and to compare current levels with commonly used reference data. Height, weight, and triceps skinfolds were measured in 1680 M-A children, 10 through 14 years of age, from the Lower Rio Grande Valley region of Texas (LRGV). Mean statures, weights, and weight/height ratios were used to determine growth status while triceps skinfold was used to estimate the occurrence of obesity and leanness. The study sample was compared to measurements gathered in 1972 involving LRGV M-A children as well as National Center for Health Statistics (NCHS) reference data for American children. Independent t tests were used to determine the significance of differences between the study sample and the two comparison groups. Among the boys, for all ages, analysis of the data revealed significant (.01) increases in height, weight, weight/height ratio, and triceps skinfold between teh study sample and the 1972 measurements and significantly greater (.01 to .05) for all ages from 1972, but triceps were significantly greater among only the 10 and 11 year olds. No significant differences existed between the study group girls and NCHS data. Results indicated considerable growth and increased adiposity among M-A children in the past decade with current levels comparing favorably to national norms. Based on the results, it was concluded these increases over the period studied were due to higher energy intakes rather than a secular trend in Mexican-Americans.

Robert Guinn
HPER Department
Pan American University
Edinburg, TX 78539

Saturday, April 12
8:15-9:45 a.m.

DEVELOPMENT OF PSYCHOMOTOR AND BEHAVIORAL CHARACTERISTICS IN YOUNG BLACK AND WHITE CHILDREN. Gabie E. Church and Geoffrey D. Broadhead, Louisiana State University, Baton Rouge.

With more and more children enrolled in some type of formal education during the preschool years, the importance of evaluation tools used to screen those likely to have difficulties in school becomes apparent. Typical of such tests is the DIAL, Developmental Indicators for the Assessment of Learning (Mardell & Goldenberg, 1975), which measures gross motor, fine motor, concept, and communication skills of 3- to 5-year olds. DIAL norms indicate linear age performance changes on all components, provide separate scales by sex, with girls outperforming boys, and report no performance differences by race. The predominant criterion for suggesting problem performance among preschoolers is communication skills. This study examined the separate contributions of the 4 DIAL components among 3-, 4-, and 5-year old black and white boys and girls ($N=610$). To establish discriminatory power, nine separate stepwise multivariate discriminant analyses of the vector of 28 variables were completed for the whole sample and for sub-samples identified by all breakdowns of sex and race (males, females, whites, blacks, white boys, white girls, black boys, black girls). In each analysis both discriminant functions were statistically significant ($p<.02$), with the first function accounting for between 74% and 93% of the explained variance. With one exception, more than half of the items included in the analyses were psychomotor. The tendency was for both gross and fine motor tasks to be over-represented, for concept skills to be appropriately represented, and for communication skills to be under-represented. These results occured regardless of sex and race. Thus, in the overall evaluation of the development of preschool children, psychomotor tasks appear to be at least as important as behavioral characteristics.

Gabie E. Church
Department of Experimental Statistics
Louisiana State University
Baton Rouge, LA 70803-5606

Saturday, April 12
8:15-9:45 a.m.

MUSCULAR STRENGTH AND ENDURANCE OF PRESCHOOL CHILDREN.

Jacqueline Herkowitz, The Ohio State University; Carol Plimpton, University of Toledo; Michael Kniffen, State University of New York at Cortland.

The purpose of this study was to: (1) establish the reliability of four measures of muscular strength and endurance (MSE), (2) define age and sex differences in MSE performance, and (3) estimate the relationship between performances on measures of MSE and selected anthropometric measures. A Stratified random sample of 120 3-,4-, and 5-year-olds, equally divided as to age and sex, was selected from the population of a large preschool and initially tested on each of four measures of MSE and five anthropometric measures. The MSE tests included a straight arm hang, a bulb dynamometer squeeze, a modified abdominal curl, and knee extension repetitions. The anthropometric measures were standing height, sitting height, weight, biacromial breadth, and biiliac breadth. The same children were tested one week later on the same four MSE measures. Test item reliability was evaluated in two ways. Pearson product moment correlations were calculated to provide a measure of the relative stability of scores on each of the MSE measures from the first to the second test administrations. Relative stability was highest for the curl, next highest for the grip measure, and lowest for the knee extensions and arm hang, in that order. The absolute stability of each of the four measures was evaluated by four separate 3-factor (age, sex, test-retest) factorial ANOVA with repeated measures on the test factor. No significant test-retest main effects were found for the grip and curl tests. Significant test-retest main effects were found for the arm hang and knee extensions measures (0 .01). Results of both reliability procedures discounted further analysis of arm hang or knee extensions data. Age and sex differences in performance on the curl and grip tests were evaluated by two separate 2-factor factorial ANOVA for Day 1 data. The age and sex main effects for the curl were significant (p .05); Scheffe' tests indicated significant differences between all age groups, with older children performing better than younger children, and girls performing better than boys. The age main effect for the grip test was also significant (p .01); Scheffe' tests indicated significant differences between all age groups, with older children performing better than younger children. Correlations between all pair combinations of the two acceptably reliable MSE measures and the five anthropometric measures were low to moderate. Th results were discuees in light of prior relevant research.

Jacqueline Herkowitz
School of Health, Physical Education and Recreation
The Ohio State University
Columbus, OH 43210

Saturday, April 12
8:15-9:45 a.m.

THE RELATION OF KNOWLEDGE DEVELOPMENT TO CHILDREN'S BASKETBALL PERFORMANCE. Karen E. French, University of South Carolina; Jerry R. Thomas, Louisiana State University.

Recent studies in verbal learning (Chi,1978; Lindberg, 1980) have shown that children can perform better than adults on memory tasks when children possess greater knowledge than adults about the information to be remembered. No studies have examined the relation of knowledge development to children's performance in sport, however. Children must acquire a variety of sport knowledge in order to make appropriate decisions within the context of sport. The purpose of this paper was to examine the relation of sport specific knowledge to the development of skilled basketball performance in children. Two experiments were conducted. Experiment 1 established the reliability and validity of a paper-and-pencil test to measure basketball knowledge, a dribbling skill test, a shooting skill test, and an observational instrument used to code the individual components of offensive basketball game performance-- control of the basketball, decisions, and motor execution. Experiment 2 compared expert and novice basketball players in two age leagues, an 8- to 10-year old league and an 11- to 12-year old league, on the components of game performance, basketball knowledge, dribbling skill, and shooting skill. The components of game performance were obtained by observation of 2 regular season games. The other measurements were administered during the regular season for each league. The results indicated that the cognitive decision component of game performance maximally discriminated expert and novice basketball players of both age groups. Expert players of both age groups possessed more shooting skill and more basketball knowledge than novices. A Canonical Correlation analysis was conducted using the components of performance and the measures of basketball knowledge, dribbling skill, and shooting skill. The canonical analysis indicated that basketball knowledge was related to the cognitive decision making component of performance, whereas dribbling and shooting skill were related to the motor components of performance, control of the basketball and motor execution. The overall results of these experiments indicate that sport specific knowledge plays a salient role in the development of decision making skills necessary for successful basketball performance in children.

Karen E. French
Department of Physical Education
Blatt Physical Education Center
University of South Carolina
Columbia, SC 29210

Saturday, April 12
8:15-9:45 a.m.

A COMPARISON OF NOVICE AND EXPERIENCED DANCERS' IMAGERY ABILITY WITH RESPECT TO THEIR PERFORMANCE ON TWO BODY AWARENESS TASKS.

Lynnette Young Overby, University of Maryland

The purpose of this study was to quantify the effects of dance training on selected perceptual motor and cognitive processes, by exploring the relationship among novice and experienced dancers in body awareness and imagery ability. Twenty experienced female dancers 18-30 years of age (with five or more years of dance training), and twenty novice female dancers 18-30 years of age (with one year or less of dance training), were utilized. Each subject performed two body awareness tasks and completed four imagery questionnaires. The Directionality (D) body awareness task required that the subject move in a specific floor pattern, direction and spatial orientation. The Reflective Body Perception (R) body awareness task required the subject to accurately reproduce body positions. In both tasks the subjects viewed the criterion movement on a large screen video monitor and were then videotaped as they reproduced the movements sighted and blindfolded. The first imagery questionnaire was The Scale For The Appraisal of Movement Satisfaction (SAMS), (Nelson & Allen, 1970). In this body image test the subjects answered questions related to the image one has of oneself as a moving entity. The second imagery questionnaire was The Movement Imagery Questionnaire (MIQ) (Hall & Pongrac, 1983). The MIQ measured individual differences in visual and kinesthetic imagery of movements. The third imagery questionnaire was The Individual Differences Questionnaire (IDQ) (Paivio, 1970). The IDQ measured the degree to which a subject habitually used imaginal or verbal modes of thinking. The fourth imagery questionnaire was the Stumpfs Cube Test (SCT) Stumpf, 1980). The SCT measured visuo-spatial ability. A multivariate repeated measures design revealed an expected trend of higher body awareness scores (D and R) for both groups in the sighted condition, and for the Experienced Dancers in both signted and blindfolded conditions. Hotellings t^2 revealed that experienced dancers consistently demonstrated high imagery ability on all questionnaires (SAMS, IDQ, MIQ, SCT); although movice dancers also demonstrated high imagery ability on two of the questionnaires (IDQ, MIQ). Canonical correlation of the body awareness and imagery scores demonstrated a trend toward positive associations in experienced dancers' body awareness (D and R), and imagery ability (SAMS, IDQ, MIQ, and SCT). This study supported the contention that dance training positively affects perceptual motor ability, i.e., body awareness, and cognitive ability, i.e., imagery ability

Lynnette Young Overby
Physical Education Department
University of Maryland
College Park MD 20742

Saturday, April 12
8:15-9:45 a.m.

THE RELATIONSHIP BETWEEN CREATIVE ABILITY IN DANCE, COGNITIVE STYLE AND CREATIVE ATTRIBUTES.

Mary Alice Brennan, University of Wisconsin-Madison.

The purpose of this study was to examine the relationships between cognitive style and the creative abilities and attributes of dancers. It was hypothesized that the more creative dancers would be more field independent and display more creative personalogical traits. Field independence-dependence measures of cognitive style (Rod and Frame Test, Embedded Figures Test), surveys of personality traits and biographic information (How Do You Think?, Biographical Inventory-Creativity) and three reliable tests of creative ability in dance (Position, Composition, Improvisation) previously developed by the experimenter were used as sources of data. Sixty female dance majors served as subjects. Movement responses to the dance creativity measures were videotaped and rated by judges on the criterion of originality. A gamma coefficient association matrix was used to provide input data for a cluster analysis and a multidimensional scaling technique. The results indicated that the variables were grouped into three separate clusters in both the cluster analysis and the multidimensional scaling technique: A = dance creativity tests (originality), B = cognitive style measures, and C = personological data. In both analyses the proximity of clusters A and B indicate a weak to moderate relationship between the group measures. No meaningful relationship is shown between clusters A and C. On the basis of these results, the following conclusions were drawn: 1) the more creative dancers display more of a relationship to field independence than the less creative dancers, and 2) the more creative dancers were not characterized by more creative personalogical attributes than the less creative dancers.

Mary Alice Brennan
Dept. Of Physical Education and Dance
University of Wisconsin-Madison
1050 University Avenue
Madison, WI 53706

Saturday, April 12
8:15-9:45 a.m.

AN ANALYSIS OF THE EFFORT DYNAMICS AND MODES OF SHAPE INTRINSIC TO SIX CLASSIFICATIONS OF MOVEMENT QUALITIES IN DANCE. Billie Frances Lepczyk, Virginia Polytechnic Institute and State University.

Since the 1940's modern dance educators have traditionally introduced students to six broad classifications of movement qualities: swinging, percussive, vibratory, collapsing, suspended and sustained. There is great variation in the movement grouped together; however, something in its nature causes it to be placed within a classification. The purpose of this study was to identify this essence through Laban movement analysis. Therefore, the problem was to identify the effort dynamics and modes of shape intrinsic to each classification of movement quality. Methods of analysis included movement experimentation and observation of live and recorded movement. One experimental method concerned nine university students, ages eighteen to twenty-three, with varying dance backgrounds. Three were break dancers with natural abilities in dance but no formal training. The others had four to fifteen years prior training in styles of ballet, modern and jazz. Students were given verbal clues as to the nature of a specific quality through its dictionary definition and its description in dance texts. Students then improvised movement of that particular quality. Selected improvisations were video taped for further analysis. The findings indicated that the six classifications do not categorize the same kinds of movement events. Movement classified as sustained quality signified any action that emphasized the effort element of sustained. Movement classified as suspended or collapsing quality was found to have an intrinsic effort rhythm composed of two effort elements. Movement classified as swinging, percussive or vibratory quality was found to have an intrinsic effort phrase. The intrinsic phrase of swinging quality was composed of three effort rhythms and those of percussive and vibratory, two. Movement created in all modes of shape appeared in each classification. However, frequently the effort dynamics of vibratory quality and occasionally percussive appeared without creating a new form in space.

Billie Frances Lepczyk
Division of HPER
Virginia Polytechnic Institute
and State University
Blacksburg, VA 24061

Saturday, April 12
8:15-9:45 a.m.

CHILDREN'S USE OF SPACE, WEIGHT, TIME, FLOW AND SHAPE AS DEFINED BY LABAN MOVEMENT ANALYSIS.

J. M. Fisher, University of Kansas; A. Baker, Brookside Day School.

The purpose of this study was to analyze first, third and fifth grade children's (n=111) use of Space, Weight, Time, Flow and Shape (3) movements in eight walking activities. The directed movement characteristics of the subjects were video-taped in natural physical education settings. Analysis of tabulations with four degrees of freedom with a chi square of 9.49 was required for significance at the .05 level for the difference between the use of the Effort/Shape Elements and the Level/Age Characteristics of the subjects. (The percentage of responses for all children is graphically displayed and not presented in this abstract). The results for each Effort/Shape and Level/Age are as follows: Space (flexible, neutral, and direct) 10.21* p= 0.03, Weight (indulgent, neutral and strong) 2.98 p=0.56, Time (sustained, neutral and quick) 19.56* p=.0006, Flow (indulgent, neutral and bound) 11.85* p=.018, Wide/Narrow Shaping (wide, neutral, narrow) 20.86* p=.0003, Rise and Sink Shaping (rise, neutral and sink) 6.86 p=.14, and Advance/Retreat Shaping (indulgent, neutral and retreating) 7.93 p=.094. The Weight, Rising/Sinking and Advancing/Retreating behaviors were not significant across the grades. The results for this study indicate a difference in the way first, third and fifth grade children used Space, Time, Flow and Wide/Narrow Shaping in their movement behaviors. These findings also suggest that movement qualities are different by age and that children have difficulty varying their movement behavior. A suggestion is made that to enhance motor control of young children, direct assessment for quality motion become a natural part of each motor development assessment, and standard curriculum designs increase experiences which increase qualities of motor control in young children.

Janet M. Fisher
161 Robinson Center
HPER Department
University of Kansas
Lawrence, KS 66045

Saturday, April 12
8:15-9:45 a.m.

RELATIONSHIPS BETWEEN BODY BUILD, BODY COMPOSITION AND PERFORMANCE OF PREPROFESSIONAL, COLLEGIATE, FEMALE BALLET DANCERS. James M. Gudgeon and Patricia A. Eisenman, University of Utah.

The purpose of this study was to examine the relationship between the stage appearance, technical dance skill, select anthropometric measures and body composition. The subjects (N = 45) were all full time ballet majors (16-22 years) attending the University of Utah Dance Department. The subjects represented a variety of levels of dance proficiency. Stage appearance (STAGE) was determined by the dance faculty using a five point likert scale. The total of technical dance skills (TOTAL) was derived from the sum of seven elements of dance proficiency as assessed by the faculty, again using a likert scale. Body composition was determined by hydrostatic weighing. The following anthropometric measures were assessed: height, weight, triceps skinfold, wrist, forearm, upper arm, shoulder, chest, waist, hips, thigh, knee, calf, and ankle girths, biacromial and bitrochanteric diameters. The zero order correlations revealed significant relationships between TOTAL and STAGE (r = 0.83), TOTAL and weight, forearm, upper arm and waist (r = -.57, -0.56, -0.56, -0.54); and STAGE and weight, percent fat, upper arm and waist (r = -0.66, -0.50, -0.72). While these results indicate that body build and body composition do influence the performance of female ballet dancers, the anthropometric and body composition variables measured in this study do not account for all the variability in the dance performance capabilities of the dancers in the study. Further research is needed to identify additional factors which might influence the success as a ballet dancer.

Patricia A. Eisenman
Department of Physical Education
University of Utah
Salt Lake City, Utah 84112

Saturday, April 12
8:15-9:45 a.m.

UNDERGRADUATE TEACHER TRAINEES' PERCEPTIONS OF TEACHING SUCCESS AND NONSUCCESS: DEVELOPMENT OF A CATEGORY SYSTEM.

Judith H. Placek, Boston University; Patt Dodds, University of Massachusetts

This study was designed to elicit critical incident descriptions of successful and nonsuccessful teaching experiences from undergraduates who had completed one or more clinical field experiences. Data were gathered from students at two universities (170 West Coast and 77 East Coast). Researchers extracted specific descriptions from original written responses and catergorized like descriptors to build a category system with mutually exclusive definitions. Once the category system was built for the two dimensions of success and nonsuccess, chi square analyses were conducted to compare responses from these subgroups: the two universities, males and females, anticipated level of teaching, subject taught this incident, grade level taught this incident, year in school, major field of study. Significant differences for success categories were found for year in school, anticipated teaching level, university, subject taught this incident, grade level taught this incident, and major field. For nonsuccess, significant differences were found for grade level taught, gender, university, and subject taught. The success and nonsuccess categories mirror each other to some degree, but differ along other dimensions. The largest subcategory of responses centered around the issue of control on both the success and nonsuccess sides. Knowledge of what features in lessons teacher trainees consider significant (i.e., pay attention to) can be helpful in structuring teacher preparation coursework and skills progressions to both meet and expand trainees' perceptions of the important events when they teach. In addition, knowledge of the features attended to by those learning to teach can be compared with the ways experienced veteran teachers view successful/nonsuccessful features in their lessons.

Judith H. Placek
Human Movement Studies
Boston University
Boston, MA 02215

Saturday, April 12
10:15-11:45 a.m.

IMAGERY ABILITY AS A MEDIATIONAL FACTOR BETWEEN TEACHER INTENTIONS AND STUDENT COGNITIONS.

Genger A. Fahleson, Boise State University; David C. Griffey, University of Wyoming; Michael D. Margolies, University of Wyoming.

This study investigated the effects of teaching acts on the thoughts and performance of fourth, sixth, and eighth grade students when learning a novel scoop-ball skill. Prior to administration of the instructional treatments, students completed questionnaires and tests assessing their imagery ability ability (kinesthetic or visual), anxiety, and initial skill ability on the scoop-ball task. Structured lessons in the scoop-ball task were scripted and presented using cues (mindings) and information that prompted students to think about their performance in either visual or kinesthetic ways. All students received both of the instructional treatments. Performance on the scoop-ball skill was measured on an objective, low-inference skill test. Students were debriefed following instuction using a stimulated-recall procedure. This investigation assessed the main effects of aptitudes and treatments (designed and perceived), assessed aptitude X treatment interactions, and examined students' cognitive processes. There was no performance difference between the two imagery preference groups. There was a significant ($p<.05$) perceived treatment X initial ability interaction. Perceived kinesthetic instruction was associated with higher posttest scored for persons scoring low on the pretest and perceived visual instruction was associated with higher posttest scores for highly skilled subjects. Those students who reported remembering, using, and finding the mindings helpful were the poorer performers. Students appeared to make metacognitive decisions and knew if they needed help. Subjects that reported remembering, using the finding and mindings helpful rated themselves higher than those who reported not remembering, using, or finding the mindings helpful. When students' did what the teacher said they perceived their performance as good, even though they may have been performing poorly. The results of this study show that students regularly think about teaching cues (mindings) in ways that are different from those the teacher intended. It was found that effective mindings are vivid and image evoking and students have preferred ways of imaging movement that are the result of metacognitive decisions rather than designed instruction.

Genger A. Fahleson
Physical Education Department
Boise State University
Boise, Idaho 83725

Saturday, April 12
10:15-11:45 a.m.

A COMPARISON OF THE TEACHING BEHAVIORS OF LOW- AND HIGH-BURNOUT ELEMENTARY PHYSICAL EDUCATION TEACHERS.

V. Mancini & D. Wuest, Ithaca College; J. Craven, London, England.

One of the most critical problems in education today is that of teacher burnout. Teacher burnout is pervasive, and the potential consequences serious. Burnout can significantly affect teachers' job performance and behaviors (Veninga & Spradley,1981). The purpose of this study was to compare the teaching behaviors and interaction patterns of those teachers suffering from burnout and those teachers not exhibiting the symptoms of burnout. Twenty (N = 20) male elementary physical education teachers were administered the Maslach Burnout Inventory (MBI)(Maslach & Jackson, 1981). Using a median split technique, teachers were classified as high-burnout (HB) or low-burnout(LB) according to their MBI scores. Five HB and five LB teachers were randomly selected to represent each group. Each teacher was videotaped for three classes. In order to describe the teachers' behaviors and interactions with their students, Cheffers' Adaptation of Flanders' Interaction Analysis System (CAFIAS)(Cheffers, 1972) was used to code the videotapes. Coder reliability was .97. Descriptive statistics were calculated to determine the relative standings of each group on each CAFIAS variable. The data revealed the LB teachers accepted and praised their students' ideas and efforts more and provided them with more feedback. In contrast, the HB teachers gave their students more directions, were more critical of their students' efforts, and exhibited less varied teaching behaviors. The LB teachers interacted more with their students; the five LB teachers exhibited 23,514 behaviors compared to 21,278 behaviors for the five HB teachers. The interaction patterns also confirmed the image of the burned out teacher "throwing out the ball" and observing silently for extended periods of time. The results of this investigation were congruent with the conclusions of Mancini, Wuest, Clark, and Ridosh (1983) who compared the behaviors of HB and LB secondary physical education teachers. The findings also substantiated the concern of Farber and Miller (1981) that burnout would have a critical impact on instruction.

Dr. Victor H. Mancini
School HPER
Ithaca College
Ithaca, NY 14850

Saturday, April 12
10:15-11:45 a.m.

The Effect of Instructional/Practice Strategy on Performance of a Simple Motor Task. Paul Dunham, Jr. University of Wyoming, Laramie.

In an attempt to maximize student achievement instructors may select from various instruction/practice procedures, including specific practice of criterion task, varied random practice and serial and gradual approximation of the stated criterion. Theories proposing each of these strategies have appeared in literature of psychology, education and physical education but empirical investigation has not been reported. Accordingly, the purpose of this study was to investigate the effect of selected instructional/practice strategies on the acquisition of a simple motor skill. Subjects in this study were right handed College students who were randomly assigned to one of three instructional/practice strategy groups. Each subject was given 24 twenty second visual-motor tracking trials with 20 second inter-trial rests utilized one of the designated practice strategies. The subjects assigned to the specific practice group had 24 trials at a target speed of 60 RPM which was criterion. Individuals utilizing the varied practice strategy had trials at 20, 30, 40, and 50 RPM presented in randomly ordered blocks of these trials (after Pigott and Shapiro, 1984). The gradual approximation group had six practice trials at the progressively increasing order of 20, 30, 40, and 50 RPM's. Following practice subjects were given a six trial test at either 60 or 35 RPM. A subjects score was recorded as time on target over the test trials. The results were analyzed employing a two way analysis of variance (3 strategy X 2 speed). The findings indicated that subjects utilizing the specific and gradual approximation practice achieved highest levels of performance than subjects utilizing the varied practice strategy. Performance of subjects tested at 35 RPM's was significantly greater than those tested at 50 RPM's. A significant practice strategy X speed interaction was observed the result of the varied practice subjects exhibiting extreme differences at 60 and 35 RPM's. In conclusion the results of this study do not lend support for any of the instructional/practice strategy proposed by theorists Skinner (1938), Henry (1959), or Schmidt (1975), but rather suggest that the frequency of approximate practice dictates the level of performance achievement inerspective of strategy. Thus an instructional/practice strategy can be adopted in response to practical constraints with no concern as to the detrimental effect such as a solution will have on performance.

Paul Dunham, Jr.
University of Wyoming
Laramie, Wyoming 82071

Saturday, April 12
10:15-11:45 a.m.

A COMPARISON OF THE INTERACTIONS OF A MALE AND A FEMALE PHYSICAL EDUCATOR AND THEIR HIGH- AND LOW-SKILLED STUDENTS' ACADEMIC LEARNING TIME-PHYSICAL EDUCATION (ALT-PE). Teresa Madden Metcalf, Union College; Victor Mancini and Deborah Wuest, Ithaca College

The interaction patterns of a male and a female physical educator with high-skilled (HS) and low-skilled (LS) elementary students were examined on a day-to-day basis for an entire 8-day unit of badminton (striking skills). The involvement and ALT-PE of these students were also investigated. Each teacher was videotaped for all classes. At the end of the unit each teacher ranked his/her students as high or low skilled, according to each student's ability. Ten students from each instructor's class, 5 HS and 5 LS, were randomly selected for observation. The interaction patterns were coded using the Dyadic Adaptation of CAFIAS (DAC) (Martinek & Mancini, 1979); the students' involvement was coded using the revised ALT-PE instrument (Siedentop, Tousignant, & Parker, 1982). Stability-reliability for the DAC coding was .984, and IOA for ALT-PE ranged from 90.5% to 100%. Descriptive statistics were calculated, and visual analysis was used to determine if differences existed in the interaction patterns of each teacher with his/her HS and LS students. Analysis of the DAC results revealed that both teachers gave the HS students more praise, acceptance, and information and received more interpretive responses from the HS students. Both teachers gave the LS students more criticism and received more predictable responses from them. The female teacher gave more praise and acceptance to the HS students than the male teacher; whereas, the male teacher gave his HS students more information and criticized his LS students more often than the female teacher. The male teacher interacted with his HS students 3,429 times and LS students 3,060 times; the female teacher interacted 3,810 times with her HS students and 3,061 times with LS students. Analysis of the ALT-PE data, based on approximately 1,000 intervals for each group, revealed that both teachers' HS students accrued more ALT-PE than their LS classmates. Both teachers' students spent more time waiting, off-task, and inappropriately engaged in motor activities than their HS peers. Analysis of the DAC and ALT-PE data on a day-to-day basis revealed variability in the percentages of various behaviors and student involvement, but some patterns did emerge. For example, on a daily basis both the male and the female teachers' HS students received more information, praise, and acceptance than their low-skilled peers; the LS students received more directions and criticism. The HS students were motor engaged more and accrued more ALT-PE on a daily basis.

Teresa Madden Metcalf
Union College - Athletic Department
Barbourville, KY 40906

Saturday, April 12
10:15-11:45 a.m.

TEACHING PERFORMANCE OF UNDERGRADUATE PHYSICAL EDUCATION MAJORS ACROSS TEACHER EDUCATION PROGRAM PRACTICA.

Andrew H. Hawkins, Robert L. Wiegand and Lisa Griffin, West Virginia University.

The purpose of this study was to establish a descriptive base for the teaching performances of trainees as they progress through a teacher education program. In conjunction with a personnel preparation project funded by the U.S. Office of Special Education, a behavioral teacher evaluation system was developed which includes eleven teacher response classes and eight student response classes (the eight learner involvement categories of ALT-PE). Category system data were collected electronically using a microprocessor (Datamyte 801). A project training course sequence was established including four courses which involved some form of field based practica (peer teaching, micro teaching, student teaching, etc.). All undergraduate teacher certification majors in physical education who completed the project training sequence during the project's three year duration served as subjects (N=55). All subjects were evaluated during each practica at least twice, and usually three or more times. Approximately twelve observations were thus conducted on each trainee over the course of usually four semesters. Teacher education faculty and doctoral and masters level graduate assistants associated with the project served as data collectors. All were trained to a minimum of an 85% interobserver agreement level using training tapes and were retrained yearly. Certain student and teacher response classes were selected for analysis based on presumed relationships to teaching effectiveness. These response classes were graphed for each trainee over the course of their teacher education program, and patterns of responding correlating with course, practica type, accountability system, class size and activity were noted. Individual subject graphs revealing certain prototypic response patterns displayed possible relationships between accountability system, class size, activity, and several key dependent measures including motor engaged time, feedback rate, sequences of instructional behaviors, and specific observation (active supervision). The descriptive information emerging from this study provides a foundation for further investigations of the nature and effects of teacher education programs on teaching performance. In particular, class accountability system, class size of practica, and activity type seem to be promising independent variables for studies which are more experimental in nature as these variables seemed to correlate with certain key dependent measures for certain trainees.

Andrew H. Hawkins
School of Physical Education
West Virginia University
P.O. Box 6116
Morgantown, WV 26506-6116

Saturday, April 12
10:15-11:45 a.m.

AN INTROSPECTIVE INQUIRY INTO WHAT AND HOW PRESERVICE CLASSROOM TEACHERS OBSERVE IN AN UNGUIDED, EARLY FIELD EXPERIENCE

Pamela C. Allison, Bowling Green State University.

Even though elementary classroom teachers may be totally responsible for the physical education instruction of their children, there has been little research on the development of their pedagogical skills in physical education. The purpose of this study was to describe what and how preservice classroom teachers observe in an unguided early physical education field experience. Seven junior education majors observed two lessons in educational games and gymnastics. Two introspective research techniques were used to collect the data: thinking aloud (TA) and stimulated recall interview (SRI). The preservice teachers thought aloud into tape recorders what they were seeing as they observed. The teachers were then interviewed individually by the investigator using the individual TA protocol and videotapes of the lessons as stimuli to recall the lessons. The TA and SRI protocols were analyzed using a constant comparative analytic strategy. Students' movement responses, lesson organization and the nonmovement characteristics of students describe what these preservice teachers observed. Students' movement captured the attention of the observers more than any other lesson facet. The observations were detailed in that a number of different dimensions of movement were noticed. Observations about the spatial aspect of movement, however, seemed to be made primarily when the students were not moving. Observations about lesson organization were made only when it was highlighted by the teacher. Observations about the nonmovement characteristics of students were predominantly focused on their off-task behavior during instruction giving. Evaluation and contrast as a part of perceptual process describe how these preservice teachers observed. Evaluations were almost exclusively of student movement and made without supportive criteria. A number of evaluations were stated with conflicting criteria. The preservice teachers also observed by contrasting similar elements of the lesson to highlight dissimilar qualities. The findings suggest preservice classroom teachers need guidance in continuing to develop skillfulness in observing. They need guidance in distinguishing relevant features in the complex moving environment of a physical education lesson and in developing criteria for evaluations. Additionally, they need practice in observing to expand their knowledge of the visual possibilities in elementary school physical education lessons.

Pamela C. Allison
School of HPER
Bowling Green State University
Bowling Green, OH 43403

Saturday, April 12
10:15-11:45 a.m.

THE EFFECTS OF ALT-PE SUPERVISORY FEEDBACK ON THE TEACHING BEHAVIORS OF PRESERVICE PHYSICAL EDUCATION TEACHERS. L. Griffin, St. Lawrence University; V. Mancini, D. Wuest, & P. Frye, Ithaca College.

The study compared the effects of conventional supervisory feedback and systematic supervisory feedback obtained through the use of the Academic Learning Time-Physical Education (ALT-PE) instrument (Siedentop, Tousignant, & Parker, 1982) on the teaching behaviors of preservice teachers. Freshmen physical education majors ($\underline{N}$ = 44)enrolled in the Elementary Games course at Ithaca College were videotaped twice while teaching in a micropeer setting. The two videotapes of each subject were coded using the ALT-PE instrument; IOA was .94. Subjects were randomly assigned to a control group and a treatment group. The subjects in the control group received conventional supervisory feedback while viewing their tapes. Subjects in the treatment group received instruction and supervision in ALT-PE in addition to conventional supervisory feedback while viewing their tapes. To identify whether differences in teaching behaviors existed between the control and the treatment groups, MANOVA was performed on the ALT-PE variables at both the context and learner involvement levels. This was followed by ANOVA to determine which of the variables independently contributed to the significant differences between the two groups. The MANOVAs on the context level variables ($\underline{F}$[6,37] = 4.384) and on the learner involvement level variables ($\underline{F}$[7,36] = 11.319) revealed significant differences between the two groups ($\underline{p}$ < .05). ANOVA revealed six ALT-PE variables on which the two groups were different when the variables were considered independently. Students of teachers in the treatment group accrued more ALT-PE, spent less time in transition and management behaviors, and more time in game play. Students of teachers in the control group spent more time engaged in off-task and on-task behaviors as well as more time waiting. Teachers who received instruction and supervision in ALT-PE were more effective and provided more opportunities for their students to be actively involved in their classes.

Linda Griffin
Dept. Leisure & Sports Studies
St. Lawrence University
Canton, NY 13617

Saturday, April 12
10:15-11:45 a.m.

THE EFFECTS OF SELF-ASSESSMENT ON THE MOTOR SKILL ACQUISITION AND SELF-APPRAISAL SKILLS OF FIFTH GRADE CHILDREN. Michael Goldberger, Temple University.

Self-assessment activities have long been advocated for inclusion in physical education curricula. It has been claimed that these kinds of learning activities are not only effective in producing improved motor performance, but also positively effect children's ability to appraise their own aptitude. The purpose of this study was to investigate the effects of the "self-check" style of teaching (Mosston, 1981) on the motor skill acquisition and self-appraisal skills of fifth grade children. Children from two elementary schools (N=224), one school serving a high socioeconic status (SES) community and the other a low SES community, were randomly assigned to one of two treatment groups or a control group. The children were assessed on their ability to perform an algorithmic motor skill prior to, midway through, and following training to assess the effects of these treatments on motor performance and the ability to predict final performance. One group of children was trained under "self-check" conditions, as described by Mosston. A second group of children underwent training under more didactic conditions; Style B conditions, in Mosston's terms. A 3 (treatment) X 2 (site) X 3 (trials) ANCOVA revealed that the children trained under "self-check" conditions significantly (p .01) outperformed both the Style B trained children and those assigned to the control group. This finding was particularly true for the high SES children. Based on these findings the use of the "self-check" style of teaching can be recommended for elementary physical education classes.

Michael Goldberger
Physical Education Department
Temple University
Philadelphia, PA 19122

Saturday, April 12
10:15-11:45 a.m.

AN EXAMINATION OF THE EFFECT(S) OF SPECIFIED TEACHER BEHAVIORS ON STUDENT ALT-PE. Debra S. Berkey, Western Michigan University; Robert L. Wiegand and Andrew H. Hawkins, West Virginia University.

The purpose of this study was to examine the effects of the manipulation of the rates of specified teacher behaviors (specific observation followed by reinforcement) on the percentage of ALT-PE of students participating in public school physical education classes. A multi-element research design was employed to observe two classes of fifth grade students during a fifteen day treatment period. There were three levels of the independent variable: high (5.0 sequences of specific observation followed by reinforcement); low (1.0 episode or less of either specific observation or reinforcement); and mixed (5.0 occurrences of specific observation but 1.0 or less of reinforcement). Six students (3 males/3 females) were systematically observed as they participated in individualized volleyball skills at five stations. Teacher and student behavior were recorded via a split-screen JVC videocassette recording system. Data was recorded by a trained doctoral student employing the behavior observation code devised by Hawkins, Wiegand and Bahneman (1982). Data was recorded on a electronic microprocessor by the observer and extracted by the investigator. Visual analysis of the percentages of ALT-PE observed indicated that significant differences existed between the high and low treatment data but not between the high and mixed or mixed and low data. High rates of sequenced teacher behavior were accompanied by higher percentages of ALT-PE. Low rates of sequenced teacher behavior were accompanied by higher percentages of on-task, off-task, interim and waiting behavior which, collectively, may comprise a task avoidance response class. Statistical analysis of the percentage of ALT-PE concurred with results indicated via visual inspection. An analysis of variance indicated that a statistically significant difference existed among the condition means: $F(2,29)=3.24$, p .05. Post hoc analysis utilizing Duncan's New Multiple Range Test indicated that a statistically significant difference existed between the high (24.4) and low (20.2) treatment means but not between the high and mixed (22.0) or low and mixed. The failure of the mixed condition to produce clear results may be an indication that the discriminating stimulus of the mixed condition was not sufficiently different from the high or low to produce substantially different results. The results of the study indicate that a functional relationship exists between teacher and student behavior. Further, that in order to produce specific behavior among students, such behavior must be systematically observed and contingently reinforced.

Debra S. Berkey
Department of HPER
216 Gary Center
Western Michigan University
Kalamazoo, MI 49008-3899

Saturday, April 12
10:15-11:45 a.m.

A COMPARATIVE ANALYSIS OF THE EXPERIENCED VS. THE NOVICE TEACHER OF P.E.--FULLER'S MODEL REVISITED. Ron E. McBride, University of Idaho

The purpose of the study was to: (1) identify and compare the self task and impact concerns of a sample group of novice and experienced teachers of physical education and (2) ascertain whether any differences were consistent by sex. After extensive investigation on the topic of concerns, Fuller (1969) posited a three stage developmental theory teachers are believed to progress as they grow and mature in their environment. The first stage, self concerns, focuses on basic survival in the classroom. Upon resolution, the teacher moves to concerns about the daily tasks of teaching. The final stage focuses upon the impact their teaching has on students. To date, most studies on teacher concerns have focused on the classroom teacher; little exists about the physical education teacher. Accordingly, 50 teachers of physical education comprised the sample group. Twenty-five were novice teachers who had completed their secondary methods courses but had not yet begun student teaching. The remaining 25 had taught extensively, averaging nearly 13 years experience. The participants completed a questionnaire designed to identify the above concern areas. Based on the rationale provided by Schutz, Smoll & Gessaroli (1983) the data were subjected to a multivariate analysis of variance (MANOVA). Initially no differences between the two groups were found on the three scales of the questionnaire, although results on the self and impact scales approached significance. Because of this, follow up t-tests for the differences between the mean scores were utilized. As Fuller's theory predicted, the novice teachers recorded a higher mean score on the self scale (M=16.60; SD=3.56)and the one-tailed t-test was marginally significant (p=.06). Furthermore, the experienced teachers scored significantly higher (p=.05) on the impact scale (M=19.28; SD=3.48) than the novices (M=17.48;SD=3.56) Differences by sex revealed no differences on the task and impact scales, but women's scores were significantly higher than the men's on the self scale (F=4.42; df=1,49 $p<.05$). Overall, the findings lend support to Fuller's three stage developmental theory of concerns in a physical education environment. Novice teachers displayed higher self concerns, while the more experienced teachers recorded higher impact concerns. It would appear that female teachers, however, may have doubts about their teaching and further study in this area is recommended.

Ron E. McBride
208--PE Building
Division of Physical Education
University of Idaho
Moscow, Idaho 83843

Saturday, April 12
10:15-11:45 a.m.

THE EFFECTS OF AUDIO-CUEING ON SELECTED TEACHING BEHAVIORS OF AN EXPERIENCED ELEMENTARY PHYSICAL EDUCATION SPECIALIST.

Hans van der Mars, University of Maine at Orono.

Experimental teaching research in physical education has been conducted mostly at the preservice level, whereas efforts at the inservice level remain minimal. In this study the effects of audio-cueing on the use of positive behavior feedback and specific positive skill feedback by a male physical education specialist were studied. The subject had five years of teaching experience at the time the study was started. The subject was videotaped while teaching a series of twenty second grade classes at a rural elementary school, with a class size of 13 students. A wireless microphone was used to collect a permanent record of the subject's verbal behavior. A multiple baseline design across behaviors was used to implement the intervention of audio-cueing. Prerecorded cues were presented at a mean rate of two per minute by way of a microcassetterecorder with mini-earphone. Data on the two target behaviors were collected through event recording by recording the temporal occurrence of the behaviors. The variable "time spent in managerial activities" was kept in baseline and used as a control variable. Data on this variable were collected using the revised ALT-PE observation system (interval recording format). Two classes in each condition were randomly selected and recoded to determine observer reliability. Agreement percentages ranged from 93% to 97.5%. Data were analyzed through visual analysis of graphs. Results showed that use of both target behaviors was increased significantly. Following a stable baseline of .37 (mean rate per minute) use of positive behavior feedback increased to a mean rate of 1.22. Specific positive skill feedback occurred at a mean rate of .30 during baseline with a slightly decreasing trend. Upon cueing this target skill the mean rate increased to 1.80 around an upward trend. At the time that the intervention was started on a variable, untreated variables remained at similar levels indicating that the change in both teaching behaviors was brought about by presenting audiocues. It was concluded that audio-cueing is effective in changing an experienced teacher's use of learner feedback that focuses on overall class behavior and motor skill performance. Currently data are being collected to determine lasting effects of the intervention over a period of seven months.

Hans van der Mars
University of Maine at Orono
Dept. of H.P.E.R.
Orono, Maine 04469

Saturday, April 12
10:15-11:45 a.m.

THE EFFECTS OF INTERVENTION ON TEACHER BEHAVIOR, ENGAGED SKILL LEARNING TIME AND STUDENT ACHIEVEMENT. Celia Regimbal, University of Northern Colorado.

The purpose of this study was to determine the effect of altering the planning and teaching strategies of experienced physical education teachers on the teacher behaviors of Teacher instruction time and Teacher management time and the resultant effect on the student behaviors of Engaged skill learning time and Student achievement. The subjects selected for this study included 12 volunteer physical education teachers and approximately 12 students from one of their fifth grade classes.

The instrument used to measure teacher and student behaviors was the Physical Education Teaching Assessment Instrument (PETAI). This instrument was designed by Phillips and Carlisle in 1983 and measures three teacher behavior variables and three student behavior variables. Teacher and student data were collected using the PETAI, videotape recordings, and a five item skills test. The teachers were randomly divided into a control group and an intervention group. The six teachers in the intervention group were asked to participate in a seven week inservice program. No restraints or guidelines relative to instruction, teaching styles, or content of subject matter were imposed by the investigator. After the intervention period posttest data were collected through the PETAI, videotape recordings, and the five item skills test.

The data were analyzed using independent and dependent $\underline{t}$ tests. It was found that teacher behaviors can be changed through intervention and that the change is positively related to changes in Engaged skill learning time and Student management time. No relationship was found between changes in Engaged skill learning time and Student achievement or changes in teacher behaviors and Student achievement.

Three conclusions were generated from the data in this study which include some cause and effect relationships. No attempt has been made to generalize beyond the 12 teachers and their students.

1. Teacher behaviors can be altered through intervention.
2. Changes can be made in engaged skill learning time and these changes are related to changes in teacher behaviors.
3. In this study, changes in student achievement are not related to changes in teacher behaviors and engaged learning time.

Celia Regimbal
PO Box 2384
Greeley,
Colorado 80632-2384

Saturday, April 12
10:15-11:45 a.m.

A FACTOR ANALYSIS OF TEACHER AND STUDENT BEHAVIOR MEASUREMENTS OF WEST VIRGINIA UNIVERSITY PHYSICAL EDUCATION MAJORS.

LenaMarie Illuzzi, West Virginia University, Robert L. Wiegand, West Virginia University, Andrew H. Hawkins, West Virginia University.

The purpose of this descriptive correlational study is to derive a conceptual organization of thirty-nine student and teacher behavioral measurements evident in the gymnasium based on factor analytic procedure. One thousand five hundred thirty observations of subjects from the undergraduate Professional Physical Education Program at West Virginia University enrolled in physical education methods classes and student teaching experiences were recorded. Data were collected utilizing electronic behavioral data processors (Hawkins, Wiegand, & Bahneman, 1983) during the academic school years beginning in the fall of 1982 through spring of 1985. The study analyzed the sequences, percentages, rates, and/or both of selected teacher behaviors: general observation, encouragement, positive feedback, corrective feedback, managerial, instruction, modeling, physical guidance, non-task verbal, off-task and specific observation. In addition, analysis of selected percentages, rates and/or both of the following student behaviors: motor appropriate, motor inappropriate, motor supporting, cognitive, on-task, off-task, interim and waiting. A percentage of missed opportunities to provide feedback and the percentage of positive feedback in selected teacher behavioral sequences were also analyzed (Hawkins, Wiegand, & Bahneman, 1983). The Statistical Analysis System SAS (1982 version) was utilized to determine the existent factor structure of behaviors within the gymnasium; additionally, factor structure change with increasing teaching experience was examined. Fifteen factors that had an eigenvalue of one or greater were derived. When they were orthogonally rotated to maximum variance seven distinct factors were evident. Finally, a distinct pattern of factor structure change emerged as a function of increased teaching experience.

LenaMarie Illuzzi
% Dr. Robert L. Wiegand
School of Physical Education
West Virginia University
Morgantown, WV 26506

Saturday, April 12
10:15-11:45 a.m.

PROFILE OF THE "IDEAL" AND "ACTUAL" UNIVERSITY TEACHER IN TEACHER EDUCATION. Hugues Leblanc, University of Sherbrooke, P.Q. (Canada).

Many studies have been conducted as to identify the most desirable teaching skills by University teachers. However, few are specific to teachers involved in student teacher programs in physical education. The purpose of this study was to determine which characteristics would be considered as the most important to master by teachers involved in the program and to identify the most used during their lectures and activities. The instrument developed and valided by Blondin (1980) was used. Two hundred and forty eight (143 men and 105 women) among 320 registered students in April 1983 answered the questionnaire. At that time, all students had taken the course Didactics of physical education in which teaching skills are studied and had practiced teaching for a few weeks. This way, students could easily make their choice among the fifteen (15) teaching characteristics identified by Blondin (1980). Briefly, the results indicated student teachers in physical education considered that the IDEAL university teacher should master his subject (75.8%), be able to bridge the gap between theory and practice (59.2%), teach from inclination (45.1%), make an interesting presentation of the subject matter (40.3%) and be structured and systematic (35.8%). The characteristic "Research and publication" was retained for only 0.4% (15th. rank). However, results indicated that the ACTUAL university teacher was quite different from the ideal one. Students affirmed that their teachers show good knowledge of their field (80.2%), they are structured and systematic (40.7%), they demonstrate a readiness of speech (35%) and they are preoccupied by research and publication (19.3%). The last retained characteristic (15th. rank) was a weakness in presenting the subject matter (4.0%). As to compare these results with new registered students in our three year program, this study will be repeated in March 1986.

Hugues Leblanc, PhD
F.E.P.S.
Université de Sherbrooke
Sherbrooke (Québec) Canada J1K 2R1

Saturday, April 12
10:15-11:45 a.m.

MOVEMENT PREFERENCE AS A PREDICTOR OF ENROLLMENT IN PHYSICAL EDUCATION CLASSES. Linda M. Lander, Bowling Green State University.

The purpose of the study was to determine categories of movement preferences, and determine if movement preferences are predictors of enrollment in university physical education classes. The study also investigated differences in movement preference according to class and sex classification. An Inventory of Movement Preferences was developed to include four primary categories of movement preference: Body, Effort, Shape, and Relationships. The movement preference categories, and sub-elements, were derived from Logsdon and Barrett's (1984) conceptualization of Laban's movement themes. The Inventory was administered to 868 students enrolled in university general physical education classes. A principal components analysis, with varimax rotation, yielded 17 factors which explained 63.1% of the total variance. The factors were: 1) Object Projection, 2) Forceful and Quick Effort, 3) Apparatus, 4) Slow, Light Effort, 5) Relationship to Music, 6) Contact with Another Person, 7) Pathways, 8) Relationship to Others, 9) Object Manipulation, 10) Compete and Cooperate with Others, 11) Manipulate Small, Hard Objects with an Implement, 12) Move in Limited Space, 13) Forcefully Extend Limbs, 14) Lift and Apply Force to Objects, 15) Slide, 16) Avoid Others, and 17) Manipulate an Object with the Hands. Movement preference items, used as predictor variables in a discriminant analysis, correctly classified 82-100% of the students in 11 categories of physical education classes. The results of a repeated measures ANOVA (movement preference factor x class) indicated that there were significant differences ($p<.0001$) among 11 categories of physical classes, on the movement preference factors. Results of repeated measures ANOVA (movement preference factor x sex) indicated that males scored significantly higher ($p<.05$) than females on Object Projection, Forceful and Quick Effort, Contact Another Person, Manipulate Objects, Manipulate Small, Hard Objects with an Implement, Move in Limited Space, Lift and Apply Force to Objects, and Manipulate Object with the Hands. Females scored significantly higher ($p<.05$) than males on Slow, Light Effort, Relationship to Music, Relationship to Others, Slide, and Avoid Others. In summary, there were 17 movement preference factors, and the movement preference items accurately predicted enrollment in physical education classes. Males and females differed significantly on certain movement preference factors. It appears that movement preferences are a potential factor in the design of physical education curricula.

Linda M. Lander
School of HPER
Bowling Green State University
Bowling Green, Ohio 43403

Saturday, April 12
10:15-11:45 a.m.

Teacher Beliefs and Behaviors Concerning Coeducational Physical Education. Judith C. Young, University of Maryland.

The institution of coeducational physical education as mandated by Title IX has raised many curricula and instructional concerns. In the ten years since this legislation took effect various initiatives, including in-service training and reorganization of programs, have occurred, but little systematic study of equity aspects of the programs has been undertaken recently. The purpose of this investigation was to: 1) describe teacher beliefs with respect to sex-equity and 2) identify teacher behaviors which characterize the level of sex-equity in the gymnasium. Title IX initiated significant obvious changes in most physical education programs through implementation of the easily observable aspects of the Title IX Physical Education Guidelines. However, such factors alone do not assure sex-fair physical education. Teacher behaviors, beliefs and instructional strategies in conjunction with the structural factors must be examined to determine the level of sex-fair presentation in selected physical education programs. The subjects for this study were secondary school physical educators and their students. Fourteen systems and 49 schools were represented. Structured interviews were conducted with 59 teachers concerning beliefs about coeducational physical education and the influence of Title IX on their programs and teaching techniques. Observations were made utilizing OSEPE to identify actual teacher behaviors concerning feedback, organization and activity-time. Results of this study suggest that sex-integrated classes have not eliminated equity concerns in physical education. Many programs had significantly more males than females enrolled in elective physical education. Physical educators perceived no change in cognitive outcomes, positive change in affective outcomes and negative change in psychomotor outcomes since the integration of classes. Most teachers had no preparation for coeducational instruction in their teacher preparation programs; and, even more significantly, less than half reported any inservice preparation for sex-integrated classes. The teachers also indicated continuing differential expectations for male and female students. Teachers reported that they believe girls and boys learn differently, boys are limited in coeducational classes and that they preferred to teach boys. These beliefs were corroborated by the observations of instruction which indicated more feedback given to boys, especially skill specific feedback; in class groupings which were single sex or random; and higher active learning time for males. These data suggest that there remains substantial differences in the experience of physical education by female and male students.

Judith C. Young
Department of Physical Education
University of Maryland
College Park, Maryland 20742

Saturday, April 12
10:15-11:45 a.m.

AN ANALYSIS OF STRENGTH OF MOVEMENT PURPOSE VALUING IN OLDER WOMEN. Kathryn L. Kisabeth, University of Maryland; Nanette J. Felloney

The purpose of this study was to examine the strength of movement purposes valuing in older women as measured on a nine point Likert scale. Sub-questions related to differences between participants and non-participants and among high, medium and low perceived skill groups. All subjects (N=45) were females between the ages of 60 and 70 with a mean age of 65.4. Individual interviews were conducted with each subject to ascertain present and past activity patterns, perceived barriers and motivators for activity and types and regularity of activity participation. Each subject completed the PPMMI-83 (Robinson et al., 1983) and rated their own skill ability. Means and S.D. were established for the total group, participants and non-participants and the three perceived skill groups. Paired T-Tests were performed on participants and non-participants, and the perceived skill groups in relation to each of the 22 movement purpose statements. Significant differences were found on three movement purposes for participants and non-participants and several significantly different items were found among the three perceived skill level groups. In addition, participants valued more movement purposes in the high range than did non-participants. The findings related to differences among perceived skill groupings support findings on this variable for other age groupings. Perceived skill ability appears to be related to strength of valuing for movement purposes. The overall findings of this study indicate that older women value different purposes than do younger age groupings. The implication is that programming for older adult activity requires different foci than general activity programming.

Dr. Kathryn L. Kisabeth and Nanette
J. Felloney, Dept. HPER
University of Maryland
College Park, MD 20742

Saturday, April 12
10:15-11:45 a.m.

TEACHERS' CONCERNS DURING IN-SERVICE EDUCATION. Nell Faucette, San Diego State University.

During a recent study on the impact of an in-service program on elementary physical education teachers, concerns' data were collected from seven teacher-participants in order to determine their types and intensities of concerns as they proceeded through the change process and their levels of use of the innovations. The Stages of Concern Questionnaire and open-ended statements of concern were administered to the teachers on three occasions during the three-month in-service program: at the outset; midway; and upon completion of the sessions. In order to amplify data collected through these instruments, observations were conducted during four in-service sessions. Additionally, individual formal interviews were conducted with the teachers at the conclusion of the in-service program. The data revealed that only two of the seven teachers became users of the innovations. It also indicated that three other participants felt positively disposed to the changes but did not become users during the in-service program. Finally, the data showed that the remaining two teachers were negatively disposed to the innovations and failed to implement the innovations. In conclusion, the teachers involved in this in-service program reacted very differently to the change process with varying types and intensities of concerns. These results support the tenets of other researchers who suggest that the concerns of participants in in-service programs can impede the implementation process and that such concerns should be identified and effectively handled before or during the process.

Nell Faucette
Physical Education Department
San Diego State University
San Diego, CA 92182

Saturday, April 12
10:15-11:45 a.m.

A CONTENT ANALYSIS OF THE INFLUENCE OF THE FITNESS MOVEMENT ON PROFESSIONAL PREPARATION IN PHYSICAL EDUCATION. H.L. Williams and B.W. Evans, Drake University, Des Moines, IA. 50311

The purpose of this study was to determine the influence of the fitness movement on professional preparation in physical education. Content analysis was used to determine the existence of fitness major and minor programs and fitness-related courses offered in selected colleges and universities. Catalogs published since 1980 were examined in terms of program and course descriptions and credits awarded. The protocol followed throughout the study was that recommended by Krippendorff (1980). As a research method, content analysis has designated procedures which require unitizing the data and development of a valid and reliable recording form. A pilot study was conducted to identify valid course categories and to establish interrater reliability. Selection of the recording units was based on a review of literature to determine conventional uses of the terminology for fitness and pedagogy. After the pilot study, the recording form was revised and reliability and validity were reassessed. Categories for course offerings were refined. A content analysis of 128 colleges and universities in the nine state Central District (AAHPERD) region offering majors in physical education was completed. Descriptive statistics and Chi-square analyses of programs and courses indicated that size of the institution and the presence of graduate programs were each significantly associated with the frequency of fitness programs ($p<.05$), while source of support (public or private) did not influence ($p>.05$) existence of such programs. The majority (over 50%) of physical education fitness-related courses were found in the foundations category. The next largest percentage of courses (over 40%) was found in the category of program skills (activities or methods) courses. Approximately 10% of all fitness-related courses dealt specifically with aspects of fitness testing, exercise prescription, program management and internships in non-school settings. In conclusion, the content analysis revealed a minimal influence of the fitness movement on professional preparation in terms of frequency and content of fitness major and minor programs in physical education departments. One limitation of this methodology is that it fails to take into account practices within programs which are not yet published. Further studies are needed to determine whether a similar pattern of influence exists within and across the other AAHPERD districts.

Dr. Hilda Lee Williams
Bell Center
Drake University
Des Moines, IA 50311

Saturday, April 12
10:15-11:45 a.m.

A NATIONAL INVESTIGATION OF WORKLOAD AND RELATED PERSONNEL POLICIES, PRACTICES AND PROCEDURES IN PHYSICAL EDUCATION DEPARTMENTS WITHIN TWO YEAR INSTITUTIONS OF HIGHER EDUCATION.

Dr. William F. Stier, Jr., SUNY-Brockport, Brockport, New York

A national investigation of two year colleges was concluded in 1985. The study sought to ascertain the present status of policies, practices and procedures pertaining to workload and other personnel matters. A research instrument used for a similar national study of four year colleges which was presented for the Research Consortium at the 1985 national AAHPERD convention was reviewed and a revised four page, twenty-six item questionnaire was created for junior/community colleges. This survey instrument was mailed to 300 randomly selected two year institutions of higher education. The response generated included 167 useable instruments for a 55% rate of return. The scope of this study included an examination of eight specific areas within the physical education departments studied. These areas included: (1) availability and development of workload and related personnel policies, (2) implementation of such policies, (3) faculty status of teachers and of coaches, (4) promotion and tenure status of faculty and of coaches, (5) role(s) and expectations of faculty and of coaches, (6) composition of workload of faculty, of coaches, and department chairpersons, (7) overload considerations and extra compensation/reduced workload factors, (8) evaluation of faculty and of coaches. CONCLUSIONS: There is a trend toward more faculty input and involvement in the determination and implementation of personnel policies in the junior/community colleges in this country. The average teaching load for physical education faculty exceeds 14.5 semester hours. Almost 45% of the departments routinely assign overloads to faculty. In addition to teaching, physical education faculty are expected to be actively involved in advising (95%), committee work (92%), service to the community/institution (83%), coaching (40%), intramural administration (35%) and administrative tasks (34%). New employees, who teach and coach, are hired as teachers first in 57% of the programs, as coaches first in 9% and with equal emphasis placed on both teaching and coaching competencies in 33% of the departments. There is a trend towards a combination, or system, of evaluation techniques for faculty (self-peer-student-administrative). Administrators devote almost 45 clock hours per week in the performance of their duties with administration, teaching and coaching comprising the greatest amount of time while research and contributing to the professional literature consume the least amount of their professional time.

Dr. William F. Stier, Jr.
Chair: Physical Education and Sport
State University of New York
Brockport, New York 14420

Saturday, April 12
10:15-11:45 a.m.

THE EVALUATION OF TEACHER EDUCATION PROGRAMS: THE CALIFORNIA EXPERIENCE. Bernard Oliver, Syracuse University.

One of the unheralded areas in the educational reform movement has been the development of standards to evaluate teacher education programs. Amidst a sea of reports calling for major changes in the teaching profession, few states have proposed changes in the standards for the program approval and evaluation which would respond to the national press calling for excellence in teachers and programs that prepare teachers (see for example A Nation at Risk, The Nation Responds, Education Under Study, A Place Called School, etc.). In lieu of responding to reform efforts, some states have relied on the National Council for Accreditation of Teacher Education (NCATE) to lead the way (Tom, 1984). Those states not aligned with NCATE have pressed for attention to be given to the regulatory process in teacher education programs (Hord, Savage, and Bethel, 1982). A key feature in state regulation of teacher education programs is trying to determine the effectiveness of teacher preparation programs in light of the criticism that these programs do not prepare teachers for the day-to-day realities of classrooms and schools (Joyce & Clift, 1984). Cooper (1980) further concluded that all that we know about evaluation and assessment have not been applied to teacher preparation programs. Accordingly, the purpose of this paper is to analyze California's developmental efforts to bring standards used in the program approval and evaluation process in line with the recommendations by the educational reform movement. To accomplish this task, the California Commission on Teacher Credentialing reviewed the program approval and evaluation process of over 15 national and professional accrediting agencies; analyzed the current state-of-the-art literature in evaluation research; reviewed existing guidelines for teacher preparation programs; and responded to concerns raised by institutions and organizations associated with higher education (Oliver, 1985). The new standards proposed for teacher preparation programs in California yielded some interesting findings for professional preparation programs. The new standards suggest that physical education programs be based on student outcomes, involve collaborative efforts with school districts, require faculty participation in public schools, and contain an effective evaluation system of college and school supervisors. In addition the presentation will address the implications for the various categories of standards for professional preparation programs.

Bernard Oliver
Department of Health and
Physical Education
Syracuse University
Syracuse, New York 13244-5040

Saturday, April 12
10:15-11:45 a.m.

DESCRIPTIVE ANALYSIS OF TEACHER BEHAVIORS IN REGULAR, MAINSTREAMED, AND ADAPTED PHYSICAL EDUCTION CLASSES.

Barbara E. Miller, Iowa State University

The major objective of this study was to examine teacher behaviors across regular, mainstreamed, and adapted physical education classes. The need for a greater understanding of the teacher behavior patterns with respect to the type of student (i.e., handicapped or nonhandicapped) being taught in physical education contributed to the significance of this study. A total of 21 physical education teachers were observed across the three settings. Each teacher was videotaped while instructing two separate classes over three days in a particular unit of instruction. Eleven of the teachers were observed teaching one regular and one mainstreamed class; three instructed two mainstreamed classes; and seven teachers taught two adapted PE classes. Four observers reliably coded the teacher behaviors using the Observational Recording Record of Physical Educator's Teaching Behaviors (ORRPETB)--Miller's A.P.E. Version. Data collection involved the interval recording method (i.e., six second observe/six second record procedure). Frequencies, interval percentages, means, and standard deviations were reported for the 27 ORRPETB categories. Univariate analysis and Tukey testing were performed on each teacher behavior in order to determine significant differences as produced by the main effect of setting. The ORRPETB data revealed that physical education teachers of adapted classes had significantly more intervals of asking questions, positive--general skill feedback, and management--with physical assistance but fewer intervals of monitoring and teacher participation than teachers of regular or mainstreamed classes. Although not statistically significant, teachers of adapted classes also demonstrated more lecture/orienting--with physical contact, physical contact, and punishment behaviors than teachers of regular or mainstreamed classes. The data appear to be indicative of alternative teaching methods or strategies employed by teachers of the respective settings who are influenced by the type of student (i.e., differences in cognitive and/or physical abilities) receiving physical education instruction.

Barbara E. Miller
Dept. of Physical Education &
Leisure Studies
Iowa State University
Ames, IA 50011

Saturday, April 12
10:15-11:45 a.m.

EXTENDED PRACTICE INFLUENCES ON REACTION TIME (RT) FOR ONE- AND TWO-COMPONENT RESPONSES. M. G. Fischman, C. Lim, and J. Sancho, Southern Illinois University.

Well-learned rapid motor acts are thought to be executed skillfully under the nonconscious control of stored motor programs (Henry, 1960). One of the strongest predictions in motor programming theory is that the RT to initiate responses governed by motor programs is dependent on their complexity, with more complex responses yielding longer RTs than less complex ones. Interestingly, the largest increases in RT have been found to occur as response complexity increases from a single component to two components. However, a criticism of studies that have supported this finding is that the number of practice trials has typically been quite small, leading to a less than adequate motor control program. It may be that with extensive practice the programming process becomes similar for one-component and two-component responses, thereby reducing, or perhaps even eliminating, the RT effects. This experiment tested this idea over 400 trials of practice on 1-target and 2-target striking responses. The tasks were similar to the ones used by Fischman (1984) in his 1-target and 2-target conditions. Ten subjects responded as rapidly as possible to an auditory signal by striking either one, or two, targets (6.0 cm diameter) with a hand-held stylus. Targets were positioned 10.0 cm apart and the movements proceeded from right to left. Subjects performed 50 trials each of the 1-target and 2-target tasks on eight separate days, with the order of conditions alternated over days. Dependent measures were RT and movement time (MT). A repeated measures ANOVA with planned comparisons indicated that, as expected, the difference in mean RT between conditions was significantly greater on Day 1 than on all other days, $p < .001$. However, there was also a significant complexity effect, indicating that overall RT for the 1-target condition (M = 158 ms) was faster than for the 2-target condition (M = 163 ms). Although small, the effect due to increased response complexity appears to be extremely robust. The effect was attenuated after additional practice trials, but never completely disappeared. Regression analyses on MT revealed significant linearity for both conditions with slopes of -2.8 ms/day and -6.6 ms/day for the 1-target and 2-target conditions, respectively, $ps < .01$. Taken together, these data suggest that although insufficient practice may result in an overestimation of the RT differences between 1-component and 2-component responses, the basic position of Henry (1960), that increased response complexity leads to longer RT, must be retained.

Mark G. Fischman
Department of Physical Education
Southern Illinois University
Carbondale, IL 62901

Saturday, April 12
12:15-1:45 p.m.

UNCERTAINTY OF STIMULUS OCCURRENCE ON REACTION TIME COMPONENTS.

David M. Koceja, Paul R. Surburg and Harold H. Morris,
Indiana University.

A common protocol in reaction time (RT) studies is the inclusion of uncertainty of stimulus occurrence or catch-trials to control anticipatory responses. Naatanen (1972) and Buckholz and Rodgers (1980) stated that catch-trials influence the process of preparation. While fractionated RT cannot differentiate between the processes of anticipation or preparation, delineation of central processing versus peripheral mechanisms affected by catch-trial use may be determined. The purpose of this study was to determine the effect of catch-trial occurrence on RT and its fractionated components. Ten college-age students participated in the experiment. Total RT was partitioned into premotor and motor components. Subjects were randomly assigned to either a 10-40 or a 40-10 group. Subjects were tested on four consecutive days, and on each day subjects engaged in 40 simple visual RT trials. The 10-40 group was tested for the first three days under a 10 percent catch-trial condition, and was tested on day four under a 40 percent catch-trial condition. In the 10-40 group, the testing protocol was reversed. Catch-trials consisted of a warning signal without subsequent visual stimulus. A factorial arrangement of treatments with subjects nested within the levels of the percent of catch-trials and crossed with days was the design used to analyze each dependent variable. The days by probability of catch-trial interaction was the primary focus of these analyses. The results included intraclass reliability coefficients that ranged between .866 and .943. Significant interactions were found for total RT ($F_{3,24} = 4.47$, $p < .05$) and for premotor time ($F_{3,24} = 3.16$, $p < .05$). No significant variations were found for motor time. A review of the analysis of the simple main effects for both total RT and premotor time led to the conclusion that a significant cross-over occurred when subjects transferred on Day 4 to a condition characterized by a change in catch-trial occurrence. It may be concluded that total RT and premotor time are affected by the probability of catch-trial occurrence. Further, the probability of catch-trial occurrence within a test day has a greater effect on total RT and premotor time than the condition under which previous practice has taken place. This is evident by the significant interactions among the days and testing conditions. Finally, peripheral mechanisms are not affected by the probability of catch-trial occurrence, as indicated by the slight but nonsignificant variation in motor time.

David M. Koceja
Department of Physical Education
Indiana University
Bloomington, IN 47405

Saturday, April 12
12:15-1:45 p.m.

THE EFFECTS OF TEMPORAL CONSTRAINTS ON THE RELATIONSHIP BETWEEN MOVEMENT SPEED AND MOVEMENT ACCURACY IN AIMED HAND MOVEMENTS.

Howard N. Zelaznik, Purdue University; Sue Mone, Purdue University; Christopher Thaman, Purdue University.

Recent work by Meyer, Smith and Wright (Psych. Review, 1982) and Schmidt, Zelaznik, Hawkins, Frank and Quinn (Psych. Review, 1979) posit an alternative "impulse variability" account of the speed accuracy relation in aimed hand movements, contrary to the relation known as Fitts law. Theoretically, the impulse variability account is based upon the motor program construct, while popular explanations of Fitts law are based upon closed-loop feedback principles. This recent impulse variability account predicts that there is a linear relation between movement speed and accuracy, while the Fitts account produces a log-linear relation. In this recent work aimed hand movements are produced under temporal constraints, in that the subject is required to terminate his/her movement as close as possible to an experimenter determined movement time. In the Fitts paradigm, the subject modulates movement time to maintain an acceptable error rate. In the present experiment aimed hand movements were performed by subjects in one of three temporal constraint conditions. These were ± 10, 20 or 40% of the goal movement times. Five average movement time conditions were manipulated; 150, 200, 250, 300 and 400 ms. For example in the 200 ms condition the 20% group was instructed that any movement time between 160 and 240 ms was acceptable, while in the 10% group this range was 180 - 220. These were crossed with three movement distances, 15, 20, and 30 cm, producing 15 unique combinations of distance-time. The temporal manipulation was thought to encourage the use of closed loop processing as the movement time window enlarged. Thus, as the temporal window enlarges we predicted that subjects would approach the task from a Fitts perspective and therefore the speed accuracy relation would become log linear, while in the small temporal tolerance case the linear speed accuracy relation would be observed. The results showed that the linear component was unaffected by our temporal tolerance manipulation, as measured by the regression coefficient, while the log-linear component increased its weight as the temporal tolerance became greater. This result implies that the linear speed accuracy relation might be a fundamental characteristic of the mechanical properties of the muscle-limb system, while the log-linear component is under strategic control.

Howard N. Zelaznik
Motor Behavior Laboratory
Department of Physical Education
Purdue University
West Lafayette, IN 47907

Saturday, April 12
12:15-1:45 p.m.

THE EFFECTS OF AGE ON UNRESISTED AND RESISTED FRACTIONATED REACTION TIME. Nancy C. Rich, Miami University.

The objective of this investigation was to examine the effect of age on the components of fractionated reaction time (pre-motor time, motor time, and total reaction time) under unresisted and resisted conditions. A total of 48 male subjects in three age categories were studied (16 in each age group): (1) 30-40 years old, (2) 50-60 years old, (3) 61-70 years old. On each of four testing days the following criterion measures were recorded: (1) 20 unresisted reaction time trials of the flexors of one arm and the extensors of the other arm, (2) twenty resisted (15 percent of maximum strength) reaction time trials of the flexors of one arm and the extensors of the other arm.

The data were analyzed with a repeated measures analysis of variance for the determination of stabilized data, and by an intraclass correlation analysis to determine the consistency of the measures. A completely randomized split plot model was used to evaluate between group differences with repeated measures of the factors of load, side, flexion versus extension, and trials.

No between group differences were found to exist for fractionated premotor time, motor time, or total reaction time. Regarding the motor times, the load by group interaction term showed that although groups 2 and 3 were faster than group 1 in the unresisted condition, they had a 6.15 percent and a 13.91 percent longer motor times than group 1, respectively, for the resisted condition. Again, the load by group interaction term for total reaction times was significant indicating that there was a significant progressive age-related decline under the resisted conditions.

The extension fractionated reaction trials displayed longer premotor times, motor times and total reaction times than the flexion trials, while the resisted trials produced longer motor times and total reaction times, but not premotor times, than the unresisted trials. There were no significant differences between the preferred and non-preferred limbs.

These data clearly suggest that there is an age-related progressive decline in the ability to generate the tension required to initiate movement of a limb against a resistance and that the slowing that occurs with aging is due primarily to peripheral mechanisms. The extension movement also requires a longer motor time to initiate movement of the limb than the flexion condition under both the unloaded and loaded condition.

Nancy C. Rich
Department of Health, Physical
Education and Recreation
Miami University
Oxford, OH 45056

Saturday, April 12
12:15-1:45 p.m.

CENTRAL AND MOTOR RESPONSE PROCESSING TO AUDITORY AND ELECTROCUTANEOUS STIMULI OF MATCHED INTENSITIES. Pamela J. Hoyles Beehler University of Texas, Arlington and Gary Kamen, Indiana University, Bloomington, IN 47405

The purpose of this study was to examine the reaction time (RT) response of previously matched auditory (A) and electrocutaneous (EC) stimuli of different intensities to determine the roles of central and motor processing during rapid voluntary movement. Fourteen female college-age subjects were screened for normal hearing and EC responses prior to testing. Two matched A and EC intensities (30 and 60 dB SPL versus 0.8 and 1.4 mA constant current, respectively) were selected for testing based on our prior research findings. Forty-eight RT trials were given over a 4 day testing period, 24 trials for each stimulus modality. These 24 trials were delivered in 12 trial blocks with 1 catch trial per block. Stimulus intensities were randomly assigned within each block of trials. Subjects were seated in a sound attenuated chamber with the right forearm placed semi-prone on a table and the elbow at 150^0 (180^0 = full extension). Surface electrodes were placed on the belly of the right biceps brachii muscle to aid in RT fractionation (premotor time, PMT; and motor time, MT). Displacement (MAXD) and time to maximal displacement (MVT) were monitored using an electrogoniometer (elgon) situated at the center of rotation of the subject's right elbow. MAXD was freely selected by the subject. A standard set of instructions were read to each subject. The response consisted of rapid right elbow flexion. Results are shown in the table below:

measure	A 30 dB SPL	A 60 dB SPL	EC 0.8 mA	EC 1.4 mA
RT (msec)	252.7	213.1	235.6	212.4
PMT (msec)	157.0	120.0	144.9	128.9
MT (msec)	95.6	92.2	90.6	83.5
MVT (msec)	212.6	214.4	215.5	213.9
MAXD (degrees)	88.7	91.3	90.8	94.9

RT and MAXD were inversely affected by increasing stimulus intensity for both A and EC stimulus modalities ($p<.05$). PMT was faster for the high intensity stimulus compared to the low intensity stimulus for both A and EC stimulus modalities as expected ($p<.05$). An unexpected finding was that MT was also faster for the high intensity stimulus compared to the low intensity stimulus for both A and EC stimulus modalities ($p<.05$). No significant changes were observed in any of the main effects (stimulus modality and stimulus intensity) for MVT. It appears that 1) both central and motor processing are altered by varying stimulus intensities, and 2) rapid movements are enhanced by increasing stimulus intensity.

Pamela J. Hoyles Beehler
University of Texas
Arlington, Texas 76019

Saturday, April 12
12:15-1:45 p.m.

SKILL LEVEL AND THE EFFICACY OF EFFECTOR VISUAL FEEDBACK IN BALL CATCHING.

Virginia A. Diggles, Mark D. Grabiner, University of Southern California; John Garhammer, California State University, Long Beach.

The purpose of this study was to assess the importance of feedback (visual) of the responding effector system and the interaction of that feedback with skill level. The importance of vision of the catching hand in ball catching is in question, particularly with skilled individuals. Clearly, vision of the ball and its trajectory is critical to a successful catch as is the proprioceptive information from the limb itself. Must we also see the hand to orient it and time its closure accurately? Further, are skilled catchers as dependent on this effector feedback as unskilled catchers? Are errors due to poor perceptual processing, resulting in incorrect temporal and spatial judgements about ball trajectory? Or do subjects correctly perceive the path of the ball but are unable to place their hand in the correct location at the right time? The type of error committed gives some clues-spatial errors (wrong location) and temporal errors (premature or late hand closure)-as do their frequencies and skill level interaction. Fischman and Schneider (1985) addressed this issue finding that skilled subjects were not hampered in their spatial judgements without vision of the limb. A 2(skill level) X 2 (vision-no vision) repeated measures design was used. Twenty subjects (ten in each skill group) sat facing a tennis ball projecting machine that was aimed at an area near the right shoulder. Ten trials were administered with normal vision and ten trials were administered with a cloth draped so the subject could not see the arm (order of conditions was balanced). All trials were recorded on a Spin Physics 2000 Video system using two cameras for later frequency and type analysis. A repeated measures ANOVA of error frequency found the main effect of skill and vision to be significant. Skilled subjects made fewer errors than unskilled and all subjects made fewer errors when they could see their arms. The type of errors revealed that unskilled subjects are equally poor at both spatial and temporal judgements, whereas skilled subjects made far more spatial errors than temporal when they could not see their arms. It appears that the skilled subjects still require vision of the arm to position it but not to time the hand closure. In marked contrast to Fischman & Schneider's findings, proprioception of the effector system is not sufficient for skilled catchers to locate their arms accurately, vision is still important.

Virginia A. Diggles, Ph. D.
PED 107, mc. 0652
University of Southern California
Los Angeles, CA 90089

Saturday, April 12
12:15-1:45 p.m.

The effect of visual feedback reliance on the organization of positioning movements. Richard Engelhorn, Iowa State University

The observation that visual information dominates proprioceptive when both are available for motor control has been a common observation in motor learning research. Changes in the availability of visual feedback after skill practice were found to affect movement error, and the significance of this effect was related to movement duration. It was the purpose of the present research to investigate the effects of motor skill practice with vision and the subsequent withdrawal of visual feedback after learning on the organization of a movement. The timing of muscular force production and the interaction of an antagonistic muscle pair during motor skill performance were the parameters of interest for this investigation. Electromyographic (EMG) data were collected from the biceps brachii and triceps brachii muscles of seven adult subjects (ages 19-29) during the performance of a forearm flexion positioning movement. Movement velocities of 75 and 150 degrees per second were used for the 60 degree movement resulting in movement times (MT) of 800 and 400 milliseconds (msec). Eighty-four trials at each MT were performed in a single testing session, with the order of presentation balanced over the subjects. The trials analyzed for EMG activity pattern and absolute MT error variables were in three blocks: trials 1-8 (pre-practice visual); trials 68-76 (post-practice visual); and trials 77-84 (post-practice non-visual). EMG activity was analyzed over six 64 msec segments for each trial using the root mean square quantification procedure. A movement velocity by trial block by analysis segment (2x3x6) ANOVA was performed on the EMG data, with a velocity by trial block (2x3) ANOVA used for the MT error scores. The MT error data revealed that subjects did improve with practice on the tasks and that the performance level did not change significantly after visual feedback was withdrawn. However, the EMG activity patterns were modified for both the biceps and triceps muscles after the removal of visual information. These changes occurred at both movement velocities and may reflect significant differences in the organization of muscular force production as well as the interaction of agonist and antagonist muscle activity during a positioning movement. After vision was eliminated as a sensory feedback source, the control mode appeared to shift from a pre-programmed response to a more closed-loop feedback dependent response, even for the faster movement.

Richard Engelhorn
Physical Education Department
Iowa State University
Ames, Iowa 50011

Saturday, April 12
12:15-1:45 p.m.

USE OF THE BILATERAL TENDON TAP PARADIGM TO EXAMINE REFLEX FUNCTION IN THE AGED.

Gary Kamen and David M. Koceja, Motor Control Laboratory, Indiana University, Bloomington, IN 47405 USA

This investigation sought to examine segmental reflex function in 9 aged (mean age = 72.5 yrs.) and 10 college-age (mean age = 25.4 yrs.) subjects using the bilateral tendon tap paradigm recently developed by our laboratory. While subjects were seated, two electromagnetic solenoid-driven hammers were positioned to tap each patellar tendon with equal force. A piezoelectric force transducer in series with the hammer was used to monitor the force of each tap. Reflex force was recorded by metal plates at the ankle to which strain gages were mounted. On each of two days, 24 randomized reflex trials were administered. For the control (C) condition, three left limb (LL) and three right limb (RL) patellar tendon reflexes (PTR) were separately elicited. Three bilateral reflex trials were elicited at intertap intervals of 0, 25, 50, 75, 150 and 300 msec. In all bilateral trials, the LL PTR was elicited first. Peak force (PF), contraction time (CT), the time needed to reach peak force, and reflex latency (LAT), the interval between reflex stimulus and force onset, were recorded on a rapidly-moving pen recorder (200 mm/sec). A 2 x 7 (Group x Condition) ANOVA model was used to detect changes in the dependent measures. The analyses for the right (test) leg revealed statistically significant ($p < .05$) differences among the intertap intervals as seen in the Table:

		INTERTAP INTERVAL (msec)					
	Control	0	25	50	75	150	300
PF(N)Y	17.4	17.2	13.9	16.4	21.6	23.7	17.3
PF(N)O	27.3	24.4	20.5	21.4	28.0	45.8	28.9
CT(msec)Y	74.6	73.6	82.8	78.0	73.5	72.3	76.1
CT(msec)O	79.0	77.6	84.1	82.4	74.4	71.7	70.1
LAT(msec)Y	58.1	58.9	59.1	57.2	56.1	55.1	60.1
LAT(msec)O	55.4	55.0	54.2	55.6	51.1	47.5	51.4

These results indicate a distinct period of depression for the test reflex extending until 50-75 msec, followed by a marked enhancement. Statistically significant differences also existed between young (Y) and old (O) groups ($p < .05$), with the old subjects exhibiting greater reflex force scores for both limbs across all intertap intervals. We conclude that age-related differences exist in tendon reflexes conditioned by a contralateral tendon tap. These differences may be due to either neuromuscular or connective tissue changes which accompany the aging process.

Gary Kamen
Department of Physical Education
Indiana University
Bloomington, IN 47405

Saturday, April 12
12:15-1:45 p.m.

FLEXIBILITY GAINS USING THREE STRETCHING METHODS AND A CONTROL GROUP.

Bruce R. Etnyre, Rice University; Eva J. Lee, Rice University; Lawrence D. Abraham, The University of Texas

The advantages of increased flexibility, commonly defined as range of motion (ROM), have long been recognized for the prevention of injuries and for the improvement of physical performance. Most previous comparative flexibility studies have examined the effectiveness of different stretching methods for increasing range of motion around only one joint (usually hip flexion). The purpose of the present study was to compare the effectiveness of each of three stretching techniques and a control group for gains of hip flexion and shoulder extension. Volunteer subjects (31 females & 49 males) participated in either a control group or in one of three treatment groups. The treatment groups stretched twice per week for 12 weeks. These groups performed either static stretch (SS) or one of two proprioceptive neuromuscular facilitation (PNF) stretching techniques. The PNF methods included were contract-relax (CR) or contract-relax with agonist contraction (CRAC). ROM measurements were obtained before beginning any treatment and once every three weeks thereafter. Results showed average range of hip flexion and shoulder extension were highly correlated ($r=.92$). All treatment groups were significantly different for both joint measures, compared to the control group which did not change over the treatment period (Control mean ROM: hip flexion = 83.6°; shoulder extension = 33.6°). Further analyses revealed average ROM for the CRAC method (hip flexion = 97.8°; shoulder extension - 46.4°) resulted in significantly greater ROM than the CR method (hip flexion = 94.4°; shoulder extension = 44.3°) which was significantly greater than the SS method (hip flexion = 91.8°; shoulder extension = 38.6°). Results showed very similar patterns over the measurement periods between hip flexion and shoulder extension for the respective experimental groups. The average ROM for the CRAC treatment group increased at each measurement period throughout the 12 weeks of treatment, while the SS method gained only slightly during the last 3 measurement periods for both hip and shoulder joint angles. It was concluded that the proprioceptive neuromuscular facilitation (PNF) stretching techniques (i.e. CR and CRAC) were more effective than static stretching methods and the CRAC method was superior to the other two methods for increasing ROM for hip flexion or shoulder extension.

Eva J. Lee
Department of Health and Human
Movement
Rice University
Houston, Texas 77251

Saturday, April 12
12:15-1:45 p.m.

INTERACTION OF RATE OF FORCE DEVELOPMENT AND DURATION OF RATE IN ISOMETRIC FORCE REPRODUCTION. Donald Siegel, Smith College.

To produce precise forces, in the absence of higher level closed-loop feedback, force-time parameters input into the motor program must multiply to a predetermined magnitude. Too short a duration with a constant force parameter will cause a response to fall short, and too great a force for a fixed duration will yield a response of greater than desired magnitude. The purpose of this study was to determine whether force and duration parameters are programmed in an interactive or independent fashion prior to executing contractions of graded intensities. Are they selected independently during programming, prior to response initiation, and through trial and error over a series of trials an optimal combination discovered and thereafter reproduced? Or is there a complex interaction between force and time variables during programming that adjusts these motor program inputs for one another so that from trial to trial they may vary, but their product approximates a desired magnitude? Four female volunteers, ranging in age from 19-25, each performed 72 isometric contractions of their elbow flexors (105 degrees) against the arm of a Cybex II at 25%, 40%, 55% and 70% of their maximal voluntary capability. For each trial a target line calibrated to the target force appeared on a CRT. Force against the Cybex II produced a curve, the peak of which could be compared to the maximum force intended. Data were concommitantly collected by computer for peak force and duration to peak force. To determine the degree of force-duration interdependence during programming, which was independent of force and time values for the immediately preceeding trial, second order partial correlations were run within subjects and conditions between average rate with which force was developed and duration. Significant inverse coefficients (p .01) were found to average across subjects -.36, -.53, -.59 and -.76 for the 25%, 40%, 55% and 70% conditions. These data provided evidence in support of the notion that force and time parameters in the motor program are selected in an interdependent way. Furthermore, it appeared that this computation occurs independent of the prior response's feedback and during the latency period between when the subject decides to initiate a response and the actual overt manifestation of force.

Donald Siegel
Dept. of Exercise & Sport Studies
Smith College
Northampton, MA 01063

Saturday, April 12
12:15-1:45 p.m.

JOINT POSITION SENSE IN SUBJECTS WITH TOTAL HIP REPLACEMENTS: THE ROLE OF MUSCLE AFFERENTS. Barbara L. Stender, John N. Drowatzky, The University of Toledo.

Initially theorists viewed Kinesthetic sense and perception as arising from muscles, tendons, and joints. As a result of studies this view was altered in the 1950's to the belief that joint receptors were the major source of input for kinesthesia. However, as a result of studies conducted from 1970 to the present the muscle spindle has emerged as source of kinesthetic input. The purpose of this study was to investigate the role of muscle spindle afferents in conscious proprioception of joint position sense by subjects who had undergone total hip arthroplasties. Twenty-three subjects, 13 with normal hips and 11 with total hip replacements including 3 subjects with bilateral total hip replacements, were tested on four proprioceptive tasks: proprioceptive matching; repositioning; visual matching; and passive positioning. Each subject received four trials on all tasks and their performances were scored in terms of degrees of error. All data were evaluated using an ANOVA with significance determined at the .05 level. No differences existed between the Normal and Hip Replacement Groups in their performances on the tasks of proprioceptive matching, repositioning and visual matching. No difference existed between groups for the passive positioning task when the absolute error was analyzed but a significant difference occurred when the direction of error was evaluated. Differences between direction of error was evaluated. Differences between trials for all tasks except passive positioning were present. No interactions were significant. The results of this study support the belief that muscle spindle afferents have a major role in kinesthetic-joint position sense.

Mrs. Barbara L. Stender
Department of Physical Education
The University of Toledo
Toledo, Ohio 43606

Saturday, April 12
12:15-1:45 p.m.

A Meta-analysis of whole-part learning of gross motor skills. Linda M. LeMura, Syracuse University; David R. Krathwohl, Syracuse University.

Methods dealing with the presentation of instructional materials have long since been recognized as vitally important in education. There is conflicting opinion relating to the efficiency of whole methods of practice as opposed to the practice of skills in parts. Since the ultimate goal of instruction is to foster a relatively permanent change in behavior, instructional methodology must be chosen carefully. This meta-analysis attempted to investigate the variables educators should consider with regard to whole or part practice for learning gross motor tasks. Eighteen studies contained the data necessary for effect size computation. Studies were categorized according to the nature of the task to be learned (externally-paced vs. internally-paced), practice schedules (massed vs. distributed practice), evaluative criteria (speed, form, accuracy, distance), and subject status (beginner, novice, advanced). A total of 64 effect sizes were generated. The results indicated a marked superiority of whole methods of practice for adult subjects and externally paced skills. Interestingly, children favored part methods of practice, perhaps signifying the appropriateness of component practice for individuals with a small repertoire of movement patterns from which to draw. This meta-analysis sought to determine the best methodological technique and under which conditions it emerges. Additionally, several recommendations for future research came as a result of this integrative review.

Linda M. LeMura
Department of HPER
Syracuse University
Syracuse, New York 13244

Saturday, April 12
12:15-1:45 p.m.

EFFECTS OF PRACTICE VARIABILITY ON LEARNING AND PERFORMING AN OPEN MOTOR SKILL. Jeffrey Barto, Luis DelRio, Shirl Hoffman, Jere Gallagher, University of Pittsburgh and University of North Carolina/Greensboro.

Schmidt's schema theory of motor learning (1975) leads to the prediction that practicing a skill under variable environmental conditions results in a higher level of performance in a novel environment than if initial practice conditions were constant. Several studies have supported this prediction with closed skills. The present experiment was a test of practice variability for an open skill (dart throw at a moving target). It was hypothesized that during the learning trials the constant practice group would be significantly better than the variable practice group. However, during the transfer phase, the variable practice group would perform with increased consistency at both the novel and constant groups speeds. Research participants (n=24) were female undergraduate students assigned to a variable or constant practice group. The task was to throw a dart at the center of a target that moved a distance of 160.02 cm. The variable group performed at two target speeds (68.80, 155.17 cm/sec) while the constant group practiced at one speed (115.32 cm/sec). The constant group practiced at the same speed for four blocks of 12 trials while the variable group practiced the two speeds randomly distributed throughout the four blocks of 12 trials. During transfer, both groups performed for 12 trials at the constant speed (115.32 cm/sec) and 12 trials at a novel speed (236.37 cm/sec). For the learning phase the 48 trials were collapsed to form four blocks of 12 trials. Absolute and variable error were then calculated. For the transfer phase, the 12 trials for each speed were collapsed into one block each to calculate absolute and constant error. The design of the study was a group (constant/variable practice) x trial blocks (4) and a group (constant/variable practice) x speed (novel, constant) completely randomized design with repeated measures on the last factors. The first design was for the learning phase while the second was for transfer. Cm of deviation from the target was measured. Four ANOVAs were calculated; two for learning and two for transfer. Results indicated that the only significant difference for the learning phase was that performance error was reduced and consistency of performance increased across trials (AE and VE $\underline{p} < .01$). During transfer, the variable groups' performance was more consistent (VE $\underline{p} < .03$) for both speeds. The results of this study expand the findings of the importance of practice variability for open skills.

Jeffrey J. Barto
125 Trees Hall
University of Pittsburgh
Pittsburgh, PA 15261

Saturday, April 12
12:15-1:45 p.m.

EFFECTS OF CONTEXTUAL INTERFERENCE ON MOTOR SKILL ACQUISITION ACROSS AGE.

Gail Polkis, Jere Gallagher, University of Pittsburgh

Random presentation of movement patterns has been demonstrated to improve subsequent retention of movement patterns by adults as opposed to presenting patterns sequentially (blocked presentation). This finding might not, however, apply to the developmentally young since they are immature processors of information. The purpose of this study was to determine the effects of blocked vs random learning of three movement patterns when the subjects had to later recall the patterns randomly. Predictions indicated that the younger children would perform more efficiently when presented the patterns in a blocked order; older children would perform more efficiently when presented the patterns randomly. The subjects in the study were twenty 5-, 7-, 11-, and 19-year-olds randomly assigned to a blocked or random group (N=80). The task was to learn three movement series. Each movement series was cued by a different colored light (choice reaction time paradigm). The movement series consisted of movements to three of four buttons in a predetermined order. The data collection was divided into a learning and retention phase. In the learning phase, the blocked group received 12 sequential trials for each of three patterns. The random groups' order of presentation of the three movement patterns was random across 36 trials. During the retention phase both groups were randomly presented the three movement patterns across 15 trials (each pattern presented 5 times). Movement time was recorded in MSEC. The design of the study was: age (5-, 7-, 11-, 19-years) x group (random/blocked) x pattern (3) x trials (12) and age x group x pattern x trials (5) completely randomized design with repeated measures on the last two factors. Separate ANOVAs were calculated for learning and retention. The major significant effects were age x group ($\underline{p} < .01$) during the learning phase and age x group x trials ($\underline{p} < .05$) for the retention phase. During learning, the difference among groups at each age narrowed through adulthood with the blocked group performing the fastest. For retention, the 5- and 7-year-olds performance in the random condition deteriorated across trials whereas those in the blocked condition remained the same or improved. No difference between groups was evident for the 11- and 19-year-olds; a ceiling of performance was apparent. These results are discussed in terms of the younger children needing to develop a knowledge of the specific patterns before being required to recall them in a random fashion.

Gail Polkis
125 Trees Hall
University of Pittsburgh
Pittsburgh, PA 15261

Saturday, April 12
12:15-1:45 p.m.

CONTEXTUAL INTERFERENCE EFFECTS IN THE LEARNING OF THREE BADMINTON SERVES.

Sinah L. Goode, Louisiana State University;Richard A. Magill,Louisiana State University.

This study investigated the generalizability of results of contextual interference effects by extending previous laboratory research to a field setting. Thirty female subjects learned three badminton serves in either a blocked (low interference), serial (mixed interference), or random (high interference) practice schedule. Throughout the experiment there were several manipulations in order to make the study more applicable to a practical learning situation. For instance, the three serves were chosen because they represent skills that would be taught in a badminton class (Ballou, 1982). Also, the tests used to measure acquisition, retention, and transfer were adaptations of commonly used badminton skill tests. The subjects practiced the short, long, and drive serves 3 days a week for 3 weeks. Following the completion of practice the subjects were given a retention and transfer test. Results replicated previous findings of contextual interference research by showing a facilitation of retention and transfer of the random group when compared to the blocked group. The significant trial block by contextual interference effects interaction for transfer also supported the generalizability of contextual interference effects, as posited by Shea and Morgan (1979), to the teaching of motor skills.

Sinah Goode
Louisiana State University
School of Health, Physical Education
Recreation, and Dance
Baton Rouge, LA 70803

Saturday, April 12
12:15-1:45 p.m.

THE INTERACTION OF CONCEPTUAL TEMPO AND MODELING ON MOTOR PERFORMANCE IN CHILDREN. Shirley D. Brown, Southern University, and Amelia M. Lee, Louisiana State University.

One of the most strongly accepted generalizations of educational research is the existence of individual differences among students. As a result of many attempts to understand these differences the concept of cognitive style has emerged as a research variable. Conceptual tempo is a dimension of cognitive style which identifies an individual as either reflective or impulsive. Reflective children have shown more ability to sustain attention and better visual memory. These characteritics may be relevant to a more thorough understanding of the relationship between movement tasks and modeling. This experiment was designed to examine the interaction of cognitive style and modeling on children's performance on a serial movement task in which both errors and speed were emphasized. Subjects (N = 48) were 10- and 11-year old males and females, classified as impulsive or reflective by Kagan's Matching Familiar Figures Test. Children were randomly assigned within cognitive style group to one of three modeling groups or a control group. The modeling strategies included: silent-model, verbal-model, and verbal-model with self-instruction. The task was a motor skill obstacle course in which both speed and errors were scored. Data were analyzed by a 2 x 4 (Cognitive style x Model type) MANOVA with the number of trials to criterion, the average number of errors per trial, and the average amount of time on three trials after reaching criterion as the dependent measures. Appropriate follow-up analyses were computed. The results indicated that reflective children performed more accurately (took fewer trials to criterion and made fewer errors per trial) than did impulsive children. There were no differences in the time scores of reflectives and impulsives. More importantly, a cognitive style x model type interaction revealed that student characteristics play a role in the modeling process. Specifically, impulsive children made significantly more errors than reflective children when performing without a model. In conclusion, the findings suggest that the performance of a student with an impulsive conceptual tempo is different from that of a reflective on a sequential motor task. Further, the impulsive student's performance can be altered by a modeling strategy, thus increasing success.

Shirley D. Brown
Department of Health and Physical
Education, Southern University
Baton Rouge, LA 70813

Saturday, April 12
12:15-1:45 p.m.

SEX DIFFERENCES IN ABILITY TO USE SPATIAL IMAGERY IN A NOVEL MOTOR TASK.

Robert Koslow, Southern Methodist University

Previous investigations of hemispheric assymetry have indicated possible sex differences in certain abilities, specifically verbal and spatial skills. General conclusions drawn from these studies imply female superiority in language related skills and male superiority in spatial related skills. The purpose of this study was to examine if sex differences relating to spatial imagery ability affect performance in a mirror tracing task. Forty male and forty female college students, all right handed, served as subjects. The task required each subject to manipulate a stylus along the edge of a five pointed star. Visual information was limited to a mirrored image of the subject's hand and the star. A control group of males (N=20) and a control group of females (N=20) were not instructed to use any particular strategy during testing. The experimental groups of males (N=20) and females (N=20), were instructed to use mental imagery through each of the 14 trials. Mental imagery consisted of using a visualized image of the star in its unreflected state whenever directional decisions were being made. Scores for both speed and accuracy were recorded. Between groups ANOVA's used to assess possible group and trial effects, revealed that both male and female imagery groups achieved significantly lower scores in both the number of errors and transversal time as compared to the male and female control groups. Furthermore, the male imagery group scores on both dependent measures were significantly lower than the female imagery group scores over the initial 8 trials. However, this difference was eradicated over the final 6 trials. The finding that mental imagery techniques facilitated skill performance was not surprising. Nor was it surprising that male scores were better than female scores across initial trials. However, the results indicated that this sex-related difference in performance was amenable through the last 6 trials. Past research addressing sex-related differences in spatial abilities have not addressed the possible influence of increased trial exposure to such a task. Based on the present findings it may be hypothesized that sex-related differences in the ability to use mental imagery techniques relating to spatial tasks may be readily rectified through relatively brief task exposure experience.

Robert E. Koslow
Physical Education Department
Southern Methodist University
P. O. Box 353
Dallas, TX 75275

Saturday, April 12
12:15-1:45 p.m.

THE EFFECT OF VARYING ANGLE OF STIMULUS APPROACH ON COINCIDENCE-ANTICIPATION TIMING PERFORMANCE. V. Gregory Payne, San Jose State University.

Fifty-six subjects, ranging in age from 18 to 25 years, were selected for this investigation designed to determine the effects of varying angle of stimulus runway approach on coincidence- anticipation timing (CAT) performance. Subjects were randomly assigned to one of four treatment situations. Each subject's CAT performance was measured using a conventional Bassin Anticipation Timer. Subjects were positioned to view the stimulus runway as it approached them directly from the front. Depending upon the subject's treatment assignment, the stimulus runway was angled at 0, 30, 60, or 90 degrees from the horizontal down to the subject. One hundred trials were administered to each subject. Data were blocked into five trial groupings for conversion into variable error (VE), absolute error (AE), and constant error (CE) scores. A two factor analysis of variance was performed on the 2 x 4 factorial design (gender by angle of stimulus approach) for each of the three error type distributions. The main effects of gender and angle, as well as the gender by angle interaction, were significant at the .05 alpha level for all three analyses (VE, AE, and CE). A Scheffe post hoc test was performed to determine the significant simple main effects. Males performed with significantly more error (though less variability) on the CE analysis but with significantly less error when the AE and VE data were analyzed. The post hoc analysis also revealed that subjects generally performed with significantly less error when stimulus treatments were closer to the horizontal position. The 0 degree treatment yielded performances which were significantly lower in error than the 90 degree treatment for all three error conditions. Based on this research, increasing the angle of stimulus approach appears to increase the subject's coincidence-anticipation timing performance error.

V. Gregory Payne
Department of Human Performance
San Jose State University
San Jose, California 95192

Saturday, April 12
12:15-1:45 p.m.

HYPNOTIC SUSCEPTIBILITY AND IMAGERY SKILLS OF ACTORS AND ATHLETES

Keith Henschen, University of Utah; Carol Pendergrast, University of North Carolina.

The purpose of this investigation was to compare susceptibility levels and imagery skills of college theatre majors and college athletes. In addition, another research question was to determine if training in these skills would effect a significant change over a specified period of time. The subjects were 166 students attending a course at The University of Utah over six continuous quarters during the 1982-83 and 1983-84 academic years. Of these subjects, 69 were athletes (28 males and 42 females) and 96 were actors (39 males and 57 females). All subjects were administered the Harvard Group Scale for Hypnotic Susceptibility - Form A (HGSH-A); and the shortened version of Betts' original Questionnaire Upon Mental Imagery (QMI); and the Gordon Test of Visual Imagery Control (TVIC) at the beginning and at the end of each course (pre and post testing). Three 2x2x2 analyses of variance at the .10 significance level were conducted in order to analyse the data. Based on the results of the data analyses, it was concluded that actors in general, and female actors in particular, were more susceptible than male or female athletes. Also, actors and athletes demonstrate similar imagery vividness and control skills, and that these skills can be improved with proper training. One intriguing result was that all subjects increased their imagery vividness scores over time. Imagery skills appear to become more refined with training.

Keith Henschen
Department of Physical Education
University of Utah
Salt Lake City, UT 84112

Saturday, April 12
3:15-4:45 p.m.

IMAGERY ORIENTATION AND STUDENT PERCEPTIONS OF INSTRUCTIONAL EVENTS. Michael D. Margolies, University of Wyoming

Recent interest in student perceptions of teachers' instruction has yielded new understanding about how students learn from formal instruction (Peterson & Swing, 1982; Winne & Marx, 1982). It has been found that student reports of their cognitive processes during instruction are much more reliable indicators of student engagement than low inference codings of instructional processes.

Subjects were tested using the Movement Imagery Questionnaire (MIQ) (Hall, 1985) and stratefied into two groups: High-Kinesthetic Imagers and High-Visual Imagers. Scripted lessons were taught and audiotaped. Cues of two distinct types were presented to students during lessons: Visual and Kinesthetic. Transcriptions of teachers' verbal interactions were given to students in post-instructional debriefing sessions. Students were asked: (1) which of the remarks they remembered the teacher making, (2) which they thought about while performing, (3) of those, which remarks were helpful and (4) they were asked to rank-order the remarks from most to least helpful.

A suprising interaction was found. Students identified as High-Visual imagers on the MIQ though about the teaching cues in kinesthetic ways -- even when the cues were intended to call up visual images. Conversely, subjects identified as High-Kinesthetic imagers reported that visual cues were most helpful. High-Kinesthetic Imagery was also identified with higher level athletes conversely High-Visuals had lower motor ability. This would support findings by Mahony & Avener (1977) Rotella, et. al. (1982) regarding use of Kinesthetic (internal) imagery by advanced athletes. This may be explained by differentiating tasks, where advanced athletes image in their preferred orientation during performance, during a learning task the preferred orientation was visual.

The study concludes that: imagery rehearsal of a learning task may be more efficatious using a visual orientation (external) while kinesthetic imagery be used for mastery performance, students regularly think about teaching cues in ways that are different from those the teacher intended, effective cues are vivid and image evoking and, students have preferred ways of imaging movement that are the result of metacognitive decisions rather than specific imagery ability. Designs of proposed follow-up studies will also be presented.

Michael D. Margolies
University of Wyoming
Laramie, Wyoming 82071

Saturday, April 12
3:15-4:45 p.m.

THE EFFECTS OF IMAGERY AND EXPERIENTIAL STATE ON BOWLING PERFORMANCE OF BEGINNING COLLEGE STUDENTS.

Gary D. Ellis, University of Utah; Burch Oglesby, Western Kentucky University.

Since Carpenter presented his "ideo-motor principle" in 1894, numerous studies have demonstrated that mental imagery can have positive effects on performance of motor skills. Considerable debate continues, however, concerning the specific process by which these effects are obtained. Carpenter's explanation was that a minute innervation of muscles to be involved in the performance of the task occurs while people are involved in imagery. Much more recently, Landers (1984) has proposed that imagery creates a "mental template" to which the body conforms during actual performance of the motor task. Another untested possibility is that the effects are due to the concentration and focusing of attention which result from imagery. Deep concentration and focusing of attention are central components of an optimal experiential state which Csikszentmihalyi (1975) called "flow." Thus, a causal model is implied which suggests that performance in a motor skill is affected by one's experiential state, which, in turn, is affected by imagery. The purpose of this study was to test that causal model. Subjects were college students in six introductory bowling classes. Based on an extensive literature review, six treatment conditions were randomly assigned to classes: internal, external, preparatory arousal and imagery, relaxation and imagery, "mythos" imagery, and control. Two additional imagery variables were measured through self report. These included vividness of imagery and ability to manipulate images. Experiential state was assessed through a self report measure described by Chalip, Csikszentmihalyi, Kleiber, and Larson (1984). Bowling performance was assessed by averaging scores from two games. Pretest measures of bowling performance, usual experiential state while bowling, and ability to image were obtained to test for equality of groups. Analysis of variance revealed no significant differences on pretest measures. Multiple regression analysis was then used to examine the causal sequence of imagery affecting experiential state and experiential state affecting bowling performance. Results provided partial support for the hypothesis. Vividness of imagery was found to be significantly related to experiential state and experiential state was found to be significantly related to bowling performance.

Gary D. Ellis
Department of Recreation and Leisure
University of Utah
Salt Lake City, UT 84112

Saturday, April 12
3:15-4:45 p.m.

A DESCRIPTIVE ANALYSIS OF THE RELATIONSHIP BETWEEN SELF-CONFIDENCE AND SELECTED PSYCHO-SOCIAL CHARACTERISTICS.

Robin S. Vealey & Dave Manzer, Miami University.

Prior research has provided a theoretical framework and valid operationalizations for the constructs of trait sport-confidence (SC-trait) and competitive orientation (Vealey, 1984). The significance of this approach lies in the improved behavioral prediction that results from measuring the type of goals upon which athletes' feelings of confidence are based. The purpose of this study was to examine the linkages in the original sport-confidence model to provide additional support for the validity of the constructs in the model. Specifically, the relationships between various demographic characteristics, goals/aspirations, perceptions of ability and success, self-confidence, and competitive orientation were examined. A secondary analysis examined athletes' reasons for participation as a function of psychological and social differences. Subjects for the study were 259 males attending summer basketball camps in the EAst and Midwest. Subjects completed the Trait Sport-Confidence Inventory (TSCI), Competitive Orientation Inventory (COI), and a questionnaire that tapped demographic information, perceptions of success and ability including goals and aspirations, and reasons for participation. Reasons for participating in sport were dichotomized into mastery and ability orientations based on the distinction made by Maehr and Nicholls (1980) and substantiated in sport by Ewing (1981). Multiple regression analyses indicated that SC-trait and experience were significant predictors of perceived ability, Multiple $R= .47$; $F(2,186)=26.72$; $p< .001$; $R^2= .22$. SC-trait and experience also emerged as significant predictors of perceived success, Multiple $R= .48$; $F(2,208) = 31.77$; $p<.001$; $R^2= .28$ as well as mastery orientation, Multiple $R= .43$; $F(2,222)= 25.54$; $p< .001$; $R^2= .19$. To examine the interacting influence of SC-trait and competitive orientation, analysis of variance procedures were used. A significant interaction emerged for mastery orientation, $F(1,50)= 6.02$, $p< .01$, with low SC-trait outcome-oriented athletes less mastery-oriented than all other groups. Low SC-trait outcome-oriented athletes also were lower in perceived ability, $F(1,50)= 9.60$, $p< .001$, as well as perceived success, $F(1,50) = 6.49$, $p< .01$, when compared to all other groups. These findings emphasize that athletes who lack self-confidence and focus on outcome goals are more extrinsic, higher in social comparison, and have lower perceptions of ability and success than athletes who are more self-confident and focus on performance. Low self-confidence seems especially debilitating for outcome-oriented athletes.

Robin S. Vealey
Phillips Hall; Miami University
Oxford, OH 45056

Saturday, April 12
3:15-4:45 p.m.

SELF-CONCEPT AND SEX-ROLE ORIENTATION OF WOMEN PHYSICAL EDUCATION MAJORS AS PERCEIVED BY THEMSELVES AND THE UNIVERSITY COMMUNITY.

Deborah K. Thompson, Bethel College; Pamela L. Rice, Murray State University

The purpose of this study was to compare the self-perception of sex role orientation for women physical education majors with perceptions held by the university community. A secondary purpose of the study was to assess the relationship of psychological sex-role orientation to self-concept of women physical education majors. Sex role orientation was measured by the Bem Sex Role Inventory (BSRI) and self-concept was measured by the Tennessee Self-Concept Scale (TSCS). Fifty women physical education majors, seventy-seven other students and seventy-six faculty members comprised the subjects for this study. The TSCS and BSRI were administered to the majors whereas only the BSRI, with special instructions to rate women physical education majors rather than themselves, was administered to the other students and faculty. Differences in perception of sex role orientation between the majors and the university community were analyzed by a Chi-square Test of Association. Discriminate analyses were used to determine which items on the BSRI were differentially emphasized by the groups of majors, other students, and faculty as well as by groups according to gender, male and female. The relationship between self-concept and results of the BSRI was assessed through stepwise multiple regression. All analyses were evaluated at the .05 level of significance. Significant differences ($x^2=10.03$, $p=.0181$) were noted in the self-perception of sex role orientation of women majors and the university community perception of the majors. Generally, the majors perceived themselves as androgynous while the university community perceived the majors to be masculine. Three items from the BSRI, tender ($F=52.26$, $p \leq .025$), conscientious ($F=27.78$, $p \leq .05$), and forceful ($F=21.52$, $p \leq .05$), were found to be significant in discriminating between majors, other students and faculty. No items on the BSRI were found to be significant discriminators for gender. Significant relationships were found between the BSRI results and self-concept. Both the masculinity ($F=13.93$, $p \leq .001$) and femininity ($F=7.92$, $p \leq .01$) scores from the BSRI were found to be significant predictors of self-concept scores for the women majors. Those majors who were high on both masculinity and femininity were highest in self-concept, majors low in both masculinity and femininity were lowest in self-concept and majors who were high on one and low on the other fell in the middle.

Deborah K. Thompson, Ed.D.
Dept. of HPER
Bethel College
McKenzie, TN 38201

Saturday, April 12
3:15-4:45 p.m.

MALE AND FEMALE SELF-CONCEPT OF ABILITY, CAUSAL DIMENSIONS, AND EXPECTATIONS WHEN PERCEIVING SUCCESS AND FAILURE ON VARIOUS MOTOR TASKS. Mary E. Rudisill, Cynthia L. Pemberton, and Christine L. Standefer. University of North Dakota.

Research has supported male and female differences in self-concept of ability (SCOA) (Nicholls, 1976), the selection of causal attributions for success and failure outcomes (Deaux & Farris, 1977; Iso-Ahola, 1979; Nicholls, 1975) and expectancies (Crandall, 1969; Montanelli and Hill, 1969). Early investigations revealed that females are more likely than males to attribute failure to a lack of ability (internal, uncontrollable, stable factors) (Dweck & Repucci, 1973; Nicholls, 1975). Moreover, females more frequently tend to attribute their success to situational factors (external, uncontrollable, and unstable factors), whereas males tend to attribute their success to internal, uncontrollable factors. In addition, males' expectations and SCOA, are higher than females' expectations and SCOA. Recent contradictive findings suggest that sex-linked differences between males and females may be diminishing (Rudisill, 1985). Therefore, this investigation was conducted primarily to compare male and female SCOA, causal dimensions, and expectations while experiencing success or failure. Male and female, college aged students (N=80) were asked to participate in this investigation. Subjects performed trials on a stabilometer task, dart-tossing task, and a pursuit rotor task and then received positive or negative false normative feedback. Dependant variables included SCOA, causal dimensions (stability, controllability, locus of causality), and expectancy scores. Results revealed significant differences between sex for SCOA across all tasks. However, no significant sex differences were found for expectations on the pursuit rotor. In addition, significant results were found for the causal dimension responses of subjects who experienced success or failure. Subjects receiving negative feedback revealed that the reason for their performance was due to a more stable factor than those subjects receiving positive feedback. This was consistent for all three tasks. The controllability and locus of causality dimensions were also influenced by positive and negative feedback. In summary, it appears that the causal dimensions, and expectancy differences between males and females are diminishing for specific tasks.

Mary E. Rudisill
Dept. of Physical Education
University of North Dakota
Grand Forks, ND 58202

Saturday, April 12
3:15-4:45 p.m.

PHYSICAL SELF-EFFICACY AND WELL-BEING IN OLDER ADULT EXERCISERS

David A. Dzewaltowski, and Diane L. Gill, The University of Iowa

The role of exercise and physical self-efficacy as mediators of older adult physical and psychological well-being was examined. Older adults (n = 57, M age = 74.0) at a city Senior Center were categorized as exercisers (n = 21) and nonexercisers (n = 33) by self-report. A comprehensive index of physical, psychological, and social function, known as the self-evaluation of life function scale (SELF; Linn & Linn, 1984), was administered to assess physical disability, symptoms of aging, self-esteem, social satisfaction, depression, and personal control. A measurement of past, present and future life-satisfaction was obtained via the 3-factor version of the life-satisfaction index-A (Wilson, Elias, Brown, & Lee, 1984). The older adults indicated their self-efficacy for performing walking, climbing stairs, and lifting tasks of increasing difficulty. Incomplete factor scores for several respondents necessitated the use of multiple t-tests to determine the differences between the exercisers and nonexercisers on the measures. Older adult exercisers did not differ from non-exercisers on the SELF factors, on level and strength of self-efficacy, or on past and future life-satisfaction, but exercisers were more satisfied with their present life. Past life-satisfaction was not significantly associated with any of the measures. Future life-satisfaction was correlated with all the efficacy measures (r = .34 to .46), symptoms of aging (r = -.37), social satisfaction (r = -.32), and depression (r = .36). Present life-satisfaction was associated with strength (r = .47) and level (r = .43) of self-efficacy for walking, symptoms of aging (r = -.43) and depression (r = -.34). Therefore, individuals who are more satisfied with their present life had higher levels of walking self-efficacy, fewer symptoms of aging, and less depression. Also, older adults who expected future life-satisfaction had higher levels of self-efficacy on all physical tasks, fewer symptoms of aging, less depression and greater social satisfaction. Strength and level of self-efficacy for walking and climbing stairs were moderately correlated with all the SELF items except for personal control (r = .32 to .71). The findings suggest that future research should isolate the causal relationships among physical self-efficacy and indicators of physical and psychological well-being in older adults.

David A. Dzewaltowski
The University of Iowa
E102 Field House
Iowa City, IA 52242

Saturday, April 12
3:15-4:45 p.m.

OLDER ADULTS' PERCEPTIONS OF PHYSICAL ACTIVITY PARTICIPATION BASED ON AGE ROLE AND SEX ROLE APPROPRIATENESS. Andrew C. Ostrow, West Virginia University; David A. Dzewaltowski, University of Iowa.

The purpose of this study was to examine the extent to which older adults sanction participation in physical activity based on age role or sex role appropriateness. Previous research by the first author with preschool children and college students indicated that social expectancies, based principally on age, contributed to the belief that one should be less physically active as one grows older. In other words, even at the age of 3 or 4 years young children had already enculturated the notion that participation in physical activity was less appropriate for older adults. What is not clear is whether older adults concur that participation in activity, particularly vigorous physical activity is less appropriate with advancing age. This was the principal question addressed in the current study. Older adults (N=62) participating in two elderhostel programs in West Virginia were group-administered an Activity Appropriateness Scale. Subjects were asked to rate (using a 7-point Likert-type format) how appropriate they felt it was for eight referent persons, who varied in assigned chronological age (20,40,60, or 80 years old) and assigned gender to participate in 12 designated physical activities, including bowling, ballet, tennis, the shot put, basketball, swimming, and bicycling. The order of presentation of the eight referent persons and 12 physical activities was assigned randomly on the Activity Appropriateness Scale. Subjects were classified as "young old" (M=63.21 years, SD=3.14) and "older old" (M=70.42 years, SD=3.44) based on a median split for chronological age. The data were analyzed using 2 (age of the subject) x 2 (gender of referent person) x 4 (age of the referent person) MANOVA across the 12 physical activities. Follow-up ANOVA and Duncan's New Multiple Range test were performed within each physical activity where appropriate. The results of the data analyses indicated that older adults viewed participation across all physical activities as less appropriate as the assigned age of the referent person increased from 20 through 80 years old. Also, the subjects viewed participation in all physical activities (except ballet) as more appropriate for males than females. The age of the referent person was a far more potent attribute than the gender of the referent person dictating these older adults' perceptions of physical activity appropriateness. The chronological age of the subjects had no bearing on their responses to the Activity Appropriateness Scale.

Andrew C. Ostrow
Sport & Exercise Studies
West Virginia University
Morgantown, WV 26506-6116

Saturday, April 12
3:15-4:45 p.m.

RELATIONSHIPS BETWEEN LEISURE AND ANXIETY: A PRELIMINARY INVESTIGATION OF RETIREES.

Jane E. Kaufman, Purdue University

The purpose of this study was to investigate three aspects of leisure (leisure satisfaction, leisure participation, and patterns of leisure activity) in relationship to each other and to anxiety levels in retirees. A four part questionnaire (Background Information, Leisure Participation, Leisure Satisfaction Scale, and "Self-Evaluation Questionnaire") was mailed to randomly selected members of the American Association of Retired Persons. Data on two hundred and twenty-five responses were analyzed using descriptive statistics, Pearson product-moment correlations, and step-wise multiple regression. The following major conclusions were reached: 1.) there is a positive relationship between leisure satisfaction and leisure participation; 2.) there is a low, negative relationship between leisure participation and anxiety levels; 3.) there is a positive relationship between various patterns of leisure activity and leisure satisfaction; 4.) there is a negative relationship between various patterns of leisure activity and anxiety levels; and 5.) there is a negative relationship between leisure satisfaction and anxiety levels. The results of this investigation hold implications in the development of recreation and leisure programs for retirees.

Jane E. Kaufman
Recreation Studies Program
Purdue University
West Lafayette, IN 47907

Saturday, April 12
3:15-4:45 p.m.

PHYSICAL FITNESS AND PSYCHOLOGICAL WELL-BEING IN COLLEGE STUDENTS. *Dianne A.R. Bartley, Howard University; Faye Z. Belgrave, Howard University.*

The purpose of this study was to observe the relationship between partipation in physical activity and psychological well-being in college students. A second purpose was to evaluate the effects of an aerobic dance fitness program on stress, self-esteem, and assertive behavior. Pre and post measures of stress, self-esteem and assertiveness were obtained on seventy college students. The experimental group comprised of students in an aerobic dance fitness class while the control group was chosen from a Health Science class. Stress, self-esteem, and assertiveness were significantly related to the amount of physical activity in this sample. The results also indicated that levels of stress decreased, and self-esteem increased as a result of participation in a ten-week aerobic dance program. These findings point to the importance of physical fitness in the psychological adjustment of college students.

Dianne A.R. Bartley
Department of Physical Education
Howard University
Washington, D.C. 20059

Saturday, April 12
3:15-4:45 p.m.

THE ASSOCIATION OF BODY CATHEXIS AND MORPHOLOGICAL VARIABLES ON COLLEGE AGED FEMALES.

T.E. Ward, B.C. McKeown, P.T. Maxwell, B.A. Barnick, The University of Texas at Arlington.

Research results focusing on body-personality correlates have not been clear nor consistent. Most research has focused on perceived physical measures and personality profiles. Research regarding the relationship between actual morphological measures and body image has been limited primarily to clinical settings. The primary purpose of this study was to determine the association among measures of body cathexis and morphology as described by individual measures of skinfolds (SFs), circumferences (cir), diameters (dia), somatotypes, estimates of body density (Db) and percent of body fat (BF). Female subjects (N=41) in a non-clinical exercise setting completed a 32 item modified Secord and Jourard Body Cathexis scale to evaluate satisfication of individual body parts. Height, weight, 6 SFs, 8 muscle cir, and 6 skeletal dia were measured. Db and BF were estimated from the triceps, thigh, and suprailiac SFs using the Jackson et al. (1980) and Brozek (1963) formulae, respectively. Mean values for age, height, weight, Db, and BF were 20.0 ± 1.4 years, 163.2 ± 5.2 cm, 56.4 ± 7.9 kg, 1.056 ± 0.012 gm/cc, 18.7 ± 5.0 % respectively. The Heath-Carter somatotype values were 4.8-3.0-2.8. Mean body cathexis values ranged from 2.1 (wrist, hair, neck) to 3.7 (thigh, hips) (1=very satisfied; 5=very dissatisfied). Zero order correlation coefficients between individual cathexis items and morphological variables were computed with 182 of the 858 correlates significant ($p \leq .05$), ranging from r=.71 (between S's ratings of their leanness with S's ectomorphic characteristics) to r=.25 (energy level ratings with ectomorphic characteristics). Independent t-tests between subjects with positive versus negative body cathexis scores indicated significant differences ($p \leq .05$) on 18 of 32 cathexis items but no significant differences existed on any of the morphological variables between the two groups. A stepwise multiple regression utilized to estimate the total body cathexis score from selected anthropometric variables, somatotype characteristics, and sum of SFs revealed an R of .22. Additional stepwise multiple regression analyses, using 16 body cathexis items as predictors of sum of SFs and somatotype characteristics, were subsequently completed. The resulting R 's were .10, .12, .26, and .33 for sum of SFs, endomorphic, mesomorphic, and ectomorphic characteristics, respectively. The results of this study suggest that moderate association exists among body cathexis and morphology of college-aged females when the subjects are randomly selected in a non-clinical exercise setting. Additionally, the results indicate that none of the morphological measures (anthropometry, somatotype, sum of SFs) adequately estimate the total body cathexis score. Furthermore, individual body cathexis items do not adequately estimate somatotype nor body fatness as indicated by the sum of SFs. Therefore, making assumptions concerning body cathexis alterations predicated on morphological changes, or morphological changes on body cathexis alterations, may be inappropriate.

Tom E. Ward
P.O. Box 19259-UTA
Arlington, TX 76019

Saturday, April 12
3:15-4:45 p.m.

THE RELATIONSHIP OF PHYSICAL ACTIVITY TO ADOLESCENT FEMALE PSYCHOLOGICAL DEVELOPMENT AND GENDER-ROLE IDENTITY.

Linda Covey; Deborah L. Feltz, Michigan State University.

This study explored the relationship between self-reported past and present physical activity levels and high school adolescent women's self-image, sense of mastery, gender-role identity, perceived attractiveness, and age of menarche. The Offer Self-Image Questionnaire and the Bem Sex Role Inventory were administered to 152 high school adolescent women. One-way MANOVA and post hoc group comparison tests were used to analyze the test results. The physical activity levels reported by subjects were categorized as follows: (a) 66% were physically active, (b) 15% were physically inactive, (c) 12% were physical activity dropouts, and (d) 7% were physical activity increasers. The majority of the subjects reported an androgenous gender-role identity except for the inactive subjects who reported primarily an undifferentiated gender-role identity. A significant effect for the Physical Activity Level Groups was found on two of the three psychological self-scales (Emotional tone; Body and self-image), all three of the coping self-scales (Mastery of external world; Psychopathology; Superior adjustment), the masculinity score on the Bem, and perceived physical ability. The active group in comparison to the (a) inactive group had higher scores on the two psychological self-scales, all three of the coping self-scales, the masculinity score, and perceived physical activity; (b) dropout group had higher perceived physical ability and later age of menarche; and (c) increaser group had no significant differences on the dependent measures. The dropout group in comparison to the (a) inactive group had higher scores on the two psychological self-scores, all three of the coping self-scores, the masculinity score, and perceived physical ability; and (b) increaser group had higher scores on the two psychological self-scores. The increaser group in comparison to the inactive group had lower feminity scores and higher perceived physical ability. The dropout group was characterized by high psychological functioning, androgenous gender-role identities, and positive feelings about physical activity. In addition, none of the dropout group subjects reported decreasing physical activity because of gender-role conflicts. These results indicate that physical activity in adolescence, in comparison with physical inactivity is associated with healthier emotional expression and emotional control and with higher levels of perceived mastery and coping skills for adolescent women. It also seems that a decrease of physical activity in adolescence does not necessarily result in psychological distress for adolescent women.

Linda A. Covey
933 W. Grand River
Williamston, MI 48895

Saturday, April 12
3:15-4:45 p.m.

EFFECTS OF FEEDBACK ON THE SELF-CONFIDENCE LEVELS OF PREADOLESCENT CHILDREN. Michael J. Stewart, University of Nebraska-Omaha; Charles B. Corbin, Arizona State University.

Various researchers have suggested that several factors undermine the confidence of females in physical activity. Among these is the lack of clear and immediate performance feedback. However, Corbin, Stewart, and Blair (1981) have suggested that the abscence of external feedback after performing a motor task perceived as gender-role inappropriate in a socially comparative situation may further lower the female's already low opinion of her own abilities, but by itself, the abscence of information of self-abilities may not result in low self-confidence. The purpose of this study was to determine if post performance self-confidence of females, known to be equal in confidence to boys before performance, was different than the self-confidence exhibited by boys. A 2 (confidence) X 2 (feedback) X 2 (gender) repeated measures (three repetitions) design was employed. A total of 111 fifth and sixth grade children (50 males and 61 females) served as subjects for the experiment. Subjects performed on the stability platform (time in balance), a task perceived to be appropriate for both males and females. Subjects were leveled in high and low confidence groups based on preperformance expectations. The feedback group received positive statements concerning the quality of performance after each of three performance trials. Future performance expectations served as the measure of self-confidence. Results indicated that lack of feedback undermined confidence of both boys and girls with low preperformance confidence. Significantly more girls were lacking in preperformance confidence even though the task was perceived as gender appropriate and was non competitive. Boys and girls performed equally well on the balance task. It appears that immediate information about performance is equally important for low confidence boys and low confidence girls.

Michael J. Stewart
School of Health, Physical
Education and Recreation
University of Nebraska-Omaha
Omaha, Nebraska 68182

Saturday, April 12
3:15-4:45 p.m.

RELATIONSHIP OF PERCEIVED AND ACTUAL FITNESS TO SELF-ESTEEM IN THIRD AND FOURTH GRADE CHILDREN.

Mary E. Engelman, Dale G. Pease, University of Houston-University Park.

Previous studies of subjects grades seven and above have concluded that perceived physical ability has influenced self-esteem more than actual physical ability (Sonstroem, 1976; Dishman & Getman, 1981). The purpose of this study was to investigate the relationship of actual physical fitness and perceived fitness to self-esteem of third and fourth grade students. The students ($n=220$) were involved in coeducational physical education classes taught by the same physical education specialist. The Washington Self-Description Questionnaire, the Texas Governors Physical Fitness Test and a general questionnaire developed by the investigators were administered. Results showed that actual fitness and the students perceived fitness correlated .55. The perceived fitness report showed 11.8% of the students believed they were below average while actual fitness testing showed 55% of these children below average. Comparisons of perceived fitness and actual fitness to global self-esteem were significant ($P < .01$) and positively correlated with actual fitness ($r=.31$) having a stronger correlation than perceived fitness ($r=.20$) to global self-esteem. With concern for stability of self-esteem across different situations, the instrument was modified to attempt to measure self-esteem in specific situations such as during the fitness unit plus during the volleyball and recreational games units. Perceived fitness and actual fitness correlated with specific self-esteem for fitness .27 and .39 respectfully. To further check the stability of self-esteem a comparison of the global self-esteem to specific self-esteem for volleyball and recreational games correlated .63 and .41 respectfully. Tests for grade, race and sex differences showed only one significant difference with boys scoring higher than girls on actual fitness. In summary the results suggest actual fitness has a stronger relationship to self-esteem than perceived fitness which is not consistant with some studies on older subjects. Data also suggest that self-esteem is subject to variation as a result of situation. Differences in perceived and actual fitness and how this may impact on self-esteem is further discussed in terms of developmental theory.

Mary E. Engelman
Department of HPER
University of Houston-UP
123 Melcher Gym
Houston, Texas 77004

Saturday, April 12
3:15-4:45 p.m.

ROLE EXPECTATIONS FOR THE SPORT PSYCHOLOGIST AS PERCEIVED BY SPORT PSYCHOLOGISTS, PHYSICAL EDUCATION DEPARTMENT AND PSYCHOLOGY DEPARTMENT CHAIRPERSONS. Michael Matlock, Jackson State University, and Joel Thirer, Illinois State University.

The purpose of this study was to assess the perceived role expectations held for the sport psychologists, and to determine the degree of consensus between physical education department chairpersons (PEDC), psychology department chairpersons (PDC), and sport psychologists (SP) on fifty-four selected role statements.

Two role expectation questionnaires were developed and validated to collect the data. Each questionnaire contained three role categories: (1) Professional Behavior, (2) Behavior Toward Clients (or subjects), and (3) Clinical and Consultative Program Development. Role statements on each questionnaire were stated similarly, using the first person for the SP and second person for the PEDC and PDC. A total sample of 113 PDC, 113 PEDC, and 135 SP were mailed questionnaires. Return rates were 35 for the PDC, 40 from the PEDC, and 84 questionnaires returned by the SP.

Analysis of the data indicated that SP, PEDC, and PDC reported significantly different responses on 10 of 54 role statements. The Wilcoxon 2-sample test indicated that of the 9 paired comparisons for the three categories, significant differences were present in 5 of the paired comparisons. On the 10 significantly different role statements the three groups showed low consensus regarding the role of the SP. The PDC and PEDC reported a significantly different cat-score on one of three comparisons. The SP and PDC also reported a significantly different category score on one of three paired comparisons, and the SP and PDC reported significantly different category scores on all three paired comparisons.

It was found that a high degree of consensus was present regarding the role of the SP by SP's, PEDC's, and PDC's for 81% of the role statements, but for 19% of the role statements presented there was substantial disagreement.

Michael Matlock
Department of HPR
Jackson State University
Jackson, Mississippi 39217

Saturday, April 12
3:15-4:45 p.m.

COMPARISON OF SELECTED BEHAVIORS AND THE PERCEPTIONS OF BEHAVIORS OF YOUTH SPORT COACHES BETWEEN PRACTICE AND GAME SETTINGS. Thomas Wandzilak and Charles J. Ansorge, University of Nebraska-Lincoln. Glenn Potter, Boise State University.

Determining the behaviors of youth sport coaches is crucial to understanding and improving coach/player interactions. Some research has examined game behaviors of coaches, but little is known about practice behaviors. The purpose of this investigation was to determine selected coaching behaviors of youth soccer coaches in game and practice settings and to establish information on the coaches' ability to estimate their own behaviors. The instrument employed to collect data was the Coaching Behavior Assessment Inventory (CBAI). It has been found reliable and effective in both practice and game settings. Twenty two observers trained and tested in using the CBAI, coded the behaviors of 17 volunteer youth sport coaches for teams of male and female players, ages 11-14 years. Sixty-nine observations were made with 17,915 behaviors coded. Four different categories were examined: encouraging remarks, instructional/organizational comments, and positive and negative reactions to participants' actions. Data analysis was concerned with ascertaining the strength of the relationships that existed among the observed coach behaviors, the coaches' ability to estimate their own actions and the players' evaluation of their coach. Separate correlated t-tests were used to determine the differences between the coaching behaviors observed and the coaches' perceptions of these actions in practice and game conditions. Results revealed that the coaches were ineffective at estimating their own practice and game behaviors. Inverse relationships were found between the percentage of instructional/organization and encouraging remarks used in games ($r= -.69$) and between instructional/organization comments and praise/positive feedback in practices ($r= -.48$). A positive relationship was found between practice and game behaviors for encouraging remarks ($r=.87$), instructional/organizational comments ($r=.52$) and positive comments ($r=.76$). Negative feedback was unrelated ($r=.07$). These findings indicate that coaches know little about their own behaviors.

Thomas M. Wandzilak
205 Mabel Lee Hall
University of Nebraska-Lincoln
Lincoln, NE. 68588-0143

Saturday, April 12
3:15-4:45 p.m.

Social Facilitation and Pain Attenuation: Implications for Youth Sports. Russell H. Lord, Eastern Montana College; Bill Kozar, Texas Tech University.

Experimental social psychology directly, and sport psychology indirectly, began 87 years ago when Triplett found that motor performance changed in social as compared with nonsocial situations. Both have developed steadily, if erratically, ever since. During the same time period, however, research in pain was largely the province of physiologists and anatomists because it was thought to be purely a sensory experience. Though the phenomena influencing and in turn being influenced by pain have increasingly been investigated by psychologists in recent years, the history of these respective research areas operated to prevent study of how they interact to affect athletes.

In sports contested by adults, pain is often an integral component to be encountered, managed, and generally tolerated. In youth sports, however, pain should always trigger concern since it can too often indicate that irreversible damage is occurring or has already occurred. Unfortunately, the disciplines bearing responsibility in this area have too long been separate.

In two studies, conducted independently but identically, 43 second and third graders, and 40 college students were exposed to cold pressor pain of water held at one to two degrees Celsius with circulating ice. The grade school students and the college students were randomly assigned to either an Alone Condition or an Observed Condition. In all conditions, each subject placed one hand into the water, and held it there "until it feels cold enough that you want to take it out." In each study, a *t* test was conducted, and for the children, being Observed (M=71.32s) produced significantly longer immersion times than being Alone (M=37.57s), $t(41)=2.56$, $p<.02$. In the college groups, however, being Observed (M=309s) was not significantly different from being Alone (M=180.77s), $t(38)=143$, $p>.05$.

Such data take on more than statistical significance when one applies them to the organized youth sport programs which involve upwards of 95% of all American youth at some time during their childhood. Since the presence of their peers affects the pain tolerance of young children and young adults in the different ways indicated by these studies, what implications does this have for youth sports contests? Are children's reports of injuries inadvertently reduced under competitive conditions, while actual injuries increase over what they might be if pain were reported in a "less biased" manner? Several recommendations are made for dealing with the implications of these studies.

Bill Kozar
Texas Tech University
Department of H.P.E.R.D.,Box 4070
Lubbock, TX 79409-4070

Saturday, April 12
3:15-4:45 p.m.

COMPETENCE PERCEPTIONS AND SOURCES OF WORRY IN HIGH, MEDIUM, AND LOW COMPETITIVE TRAIT ANXIOUS YOUNG ATHLETES.

Robert J. Brustad, University of Oregon; Maureen R. Weiss, University of Oregon.

This study was designed to further the existing body of knowledge regarding the affective characteristics of youth sport involvement and to examine more closely potential correlates of competitive trait anxiety (CTA) in young athletes. The present study extended Passer's (1983) research on patterns of CTA in young male soccer players by including female athletes and athletes involved in a different youth sport. Fifty-five boy baseball players and 58 girl softball players, ages 9 to 13, who participated in an agency-sponsored sports program, completed self-report measures of self-esteem, perceived physical competence, and frequency of evaluative and performance-related worries about athletic competition. Multivariate analyses revealed that differences existed between the high- and low-CTA boys, with high-CTA boys reporting lower levels of self-esteem and more frequent worries about their performance than did their less anxious counterparts. These findings were consistent with those reported by Passer (1983). For the girls, no significant relationships were found between levels of competitive trait anxiety and the personality variables examined. The absence of significant findings for the girls suggests that a need exists to better understand the antecedents of competitive trait anxiety among young female athletes. To enhance the experiences of youth sport participants, it is essential that the contributors to, and consequences of, competitive trait anxiety be more closely examined.

Robert J. Brustad
Dept. of Physical Education
University of Oregon
Eugene, OR 97403

Saturday, April 12
3:15-4:45 p.m.

THE EFFECT OF BALL SIZE ON GAME PERFORMANCE OF 9-12 YR. OLD FEMALE SOFTBALL PLAYERS.

Sandy K. Beveridge, Don F. Nendell, University of Utah; Steven W. Edwards, Oklahoma State University.

The purpose of this study was to determine the effects of ball size on the game playing abilities of 9-12 yr. old female fastpitch softball players. Individual player game statistics were collected for five Bonnett Ball teams (N-52) who participated in two state tournaments, one which used the unofficial 11" softball, and one which used the official 12" softball. The Amateur Sofball Association (ASA) official scorebook was utilized for collection of 47 variables related to batting, fielding, and pitching (i.e. fielding errors, strike outs, hits) for each player. Significant correlated t-test results indicated that there were fewer errors, better fielding averages, and more strike outs when players played with the 11" ball. It was also observed that the injury ratio was almost four times greater in games using the 12" softball. A survey of coaches and playes revealed unanimous preference for the 11" softball due to its ease of handling. The results indicate that the playing characteristics of the 11" softball are most suited to successful performance for the young female softball player than the 12" softball. It may be that the smaller ball is more appropriate as the official ball for the softball leagues for female players of this age group.

Sandy Beveridge
Department of Physical Education
University of Utah
Salt Lake City, Utah 84112

Saturday, April 12
3:15-4:45 p.m.

COACTION EFFECTS UPON CHILDREN'S THROWING ACCURACY, VELOCITY, AND MOVEMENT COMPONENT PATTERNS.

Mary Jo MacCracken, Akron University; Robert E. Stadulis, Kent State University; Stephen J. Langendorfer, Kent State University

Previous research (MacCracken & Stadulis, 1984; 1985) using dynamic balance tasks has demonstrated a positive social facilitation effect by coaction upon children regardless of their skill level. The present study attempted to determine if the consistent positive effects of coaction apply across other tasks such as throwing. Boys and girls (N=26), of 3.3 to 14.8 years old, were tested over ten trials: 1) with a coactor - a child of the same sex and age, and 2) alone - no coactor present. Latin square procedures were used to counter-balance potential situation order effects. The throwing task consisted of trying to hit the center of a large (245 cm diameter) circular target. Throwers were instructed to try to "hit the center of the target"; no emphasis upon force was provided. The accuracy (distance in cm from the center), the horizontal ball velocity (in meters per second from video-tape analysis), and the movement quality of five components (ordinal rankings, using the Roberton Component Category Checklist, from video-taped analysis of backswing, stepping, trunk, forearm, and humerus actions) of the throw were measured. ANOVA indicated that the coaction situation resulted in greater velocity (p=.005) of the throw than the alone situation. Similarly, Chi Square analysis indicated that boys and girls evidenced a higher developmental pattern of stepping action when coacting. For the boys only, both the forearm and humerus actions were at a higher level under the coaction situation. No significant differences in accuracy scores were detected across situations. Neither age nor sex were found to interact with the situation effect. Regardless of developmental status, coaction resulted in greater velocity of the throw. These results using the throwing task further support the general positive social facilitation effect of coaction in children observed previously in the balance tasks.

Dr. Mary Jo MacCracken
Department of Physical Education
The University of Akron
Akron, Ohio 44325

Saturday, April 12
3:15-4:45 p.m.

EFFECTS OF GAINS IN PERFORMANCE ON ATTITUDES FORMED TOWARD A MOTOR LEARNING TASK.

Ann McConnell, Southeast Missouri State University.

Two hypotheses were tested: (1) A group which has the greatest number of gains in performance on successive trial scores will develop a more positive attitude toward the task; (2) A group which has the greatest gains in performance in successive trials will show the greatest change in an already formed attitude. Male (N=12) and female (N=12) high school students from the University High School in Cape Girardeau, Missouri, were randomly selected and randomly divided into two groups with an equal number of males and females in each group. The subjects performed 12 trials of 15 seconds each of a rotary pursuit task; read directions for completion of the attitude measuring instrument and then completed the instrument. This series of activities was completed a second time. The difference in the treatment of the two groups occurred in the KR (time-on-target). The A group received its KR during the first 12 trials to the full second. During the second 12 trials, the A group received its KR to .01th of a second. The B group was the reverse of this procedure. The B group received its KR to .01th of a second during the first 12 trials and in the second 12 trials the KR was given to a full second. The difference in treatment caused the subjects in the .01th of a second group to achieve more gains in performance than those whose KR was to a full second. The motor learning performance scores were significantly different between the first and second set of trials and between the sexes. The two factorial analyses of attitude scores did not support the hypotheses. There was a significant interaction with girls' attitudes, improving significantly when more precise information produced an increased number of gains.

Ann McConnell
Department of Health, Physical
Education and Recreation
Southeast Missouri State University
Cape Girardeau, MO 63701

Saturday, April 12
3:15-4:45 p.m.

RELATIONSHIPS AMONG CSAI-2 SUBCOMPONENTS AND PERFORMANCE DURING COLLEGIATE GOLF COMPETITION.

Vikki Krane, College of William and Mary. Jean Williams, University of Arizona.

The present study examined the relationships among the CSAI-2 subcomponents and collegiate golf performance. Changes in cognitive anxiety, somatic anxiety, and self-confidence were monitored during a women's intercollegiate invitational golf tournament. The golfer's (n=69) completed the CSAI-2 immediately prior to and immediately after the first two tournament rounds. When comparing golfers on actual golf score, the correlational data showed high self-confidence and low cognitive anxiety were related to better performance. Somatic anxiety was not a distinguishing characteristic between these golfers. Further, competitive trait axniety was more highly correlated to cognitive anxiety and self-confidence than somatic anxiety. Multiple regression analyses showed CTA to be the best predictor of each CSAI-2 subcomponent. Multiple regression analyses examining the possible antecedents of golf performance showed performance on the previous round of golf (the practice or first round) to be the sole significant predictor of subsequent performance. However, when the CSAI-2 subcomponents were included in the prediction equation, they accounted for an additional 7-10% of the variance. Finally, those golfers who performed poorly on the first tournament round exhibited higher cognitive anxiety and lower self-confidence prior to the second tournament round. It appeared that performance influenced mental states more than mental states influenced performance. The present results are not completely congruent with previous studies using the CSAI-2. Possible explanations discussed included the type sports studied and skill levels of the athletes. Further replication of studies using the CSAI-2 is necessary since the current limited data base is not sufficient to form any confident conclusions.

Vikki Krane
Women's Athletics
Adair Gym
College of William and Mary
Williamsburg, VA 23185

Saturday, April 12
3:15-4:45 p.m.

THE RELATIONSHIP BETWEEN CONFIDENCE, SOMATIC AND COGNITIVE ANXIETY AND PERFORMANCE IN GOLF.

Joan L. Duda, Department of PEHRS, Purdue University.

The purpose of this study was to determine the relationship between state perceptions of confidence, somatic and cognitive anxiety and performance in golf. Dispositional measures of anxiety (SCAT), competitive worries (Scanlan & Lewthwaite, 1984), and confidence in golf skills, (Vealey, 1984) as well as actual ability (USGA handicap and season's average for 18 holes) were examined as possible mediators of the relationship between state responses and performance. Subjects were 15 members of an intercollegiate women's golf team at a major midwest university. Trait assessments of anxiety, competitive worries, and confidence were taken at the beginning of the competitive season. State perceptions of confidence, somatic and cognitive anxiety, measured by the CSAI-2, were determined before four rounds of 9 holes during an intercollegiate season. Four measures of performance, defined as the final score over 9 holes, were used as dependent variables. Preliminary results indicate that state perceptions of somatic anxiety and confidence were significantly predicted by SCAT and the dispositional confidence measure, respectively. Further, golf performance was significantly related to somatic anxiety and level of confidence. Golfers who felt more confident before a round of 9 holes tended to perform better during that round. Golfers who had higher levels of somatic anxiety were more likely to have higher scores over 9 holes. Importantly, variations in optimal state confidence and anxiety responses were linked to individual differences in psychological dispositions. The implications of these results in respect to furthering our understanding of the interdependence between confidence, anxiety, and performance and broadening future work on the inverted-U hypothesis in sport will be discussed. It will be argued that a multicomponent approach to the state responses of athletes is paramount to effective performance enhancement psychological interventions.

Joan L. Duda, Ph.D.
Associate Professor - Purdue
Lambert Gym - PEHRS
West Lafayette, IN 47906

Saturday, April 12
3:15-4:45 p.m.

IDEOGRAPHIC ANALYSES OF BEHAVIOR AND SUBSEQUENT INTERVENTION STRATEGIES FOR ELITE SKIERS. Robin S. Vealey, Miami University.

The purpose of this study was to (a) examine the physical and psychological behavior patterns of elite skiers across time, and (b) design individualized intervention strategies based on the emergent patterns for each skier. An ideographic approach (Allport, 1961) was followed in which two female members of the U. S. Nordic Ski Team served as subjects. In single case research, behaviors are measured over time so that judgments can be made based on the overall pattern of data. Seen as a radical departure from the traditional between-groups approach in sport psychology, single case research may provide important information about the uniqueness of individuals by illustrating subtle trends in human behavior often lost in empirical validation using large groups. This research is presented as a model by which sport psychologists can monitor individual behavior and make inferences from repeated observations to individualize intervention strategies with athletes. Subjects A and B monitored their behavior over a series of World Cup races in Europe. Specifically, after each race, subjects completed an objective questionnaire with a Likert scale format that tapped environmental conditions, pre-race behavior, in-race behavior, post-race affect and cognitions, and performance. Also, Subjects A and B recorded subjective comments, feelings, and cognitions about each race in a detailed log. The pattern of results for each skier is presented via graphic representation of intra-subject relationships, split middle method of trend estimation (White, 1972), and time series analysis (Ostrom, 1978). For Subject A, the analyses revealed an inability to ski relaxed and use proper technique during the middle portion of the races. Her performance was also significantly related to mental preparation prior to the race. Subject A's cognition pattern indicated a strong internal locus of control, effort and unstable ability attributions, and satisfaction based on achieving personal goals as opposed to race outcome. An individualized intervention model for Subject A emphasizing pre-race mental preparation and cognitive and physical relaxation training is presented based on these results. The results for Subject B indicated a breakdown in technique and concentration at the end of the races which had a significant influence on race performance. An analysis of Subject B's cognition pattern indicated a trend toward a self-serving bias in attributions yet strong expectancies of success in future races. An individualized model emphasizing attribution retraining, personal goal setting, and attentional control training is presented for Subject B.

Robin S. Vealey
Phillips Hall
Miami University
Oxford, OH 45056

Saturday, April 12
3:15-4:45 p.m.

A COMPARISON OF A COACH'S INTERACTIONS WITH HIGH- AND LOW-SKILLED INTERCOLLEGIATE DIVERS.

D. Rush, Skidmore College; V. Mancini & D. Wuest, Ithaca College.

The purpose of this investigation was to compare a male coach's interactions with his high-skilled (HS) and low-skilled (LS) female intercollegiate springboard divers. The coach was videotaped for 10 practices, lasting from 2 to 2½ hours, throughout the season. At the end of the season, the six divers were ranked according to the average of the scores received in the meets held throughout the season. The three divers with the highest scores were designated as high-skilled, and the three divers with the lowest scores classified as low-skilled. The videotapes were then coded by a trained coder using the Dyadic Adaptation of Cheffers' Interaction Analysis System (DAC) (Martinek & Mancini, 1979). Coder reliability was determined to be .988. Following computer analysis of the codings, descriptive statistics were calculated and visual comparisons used to identify differences between the groups. The coach interacted more with the HS divers; a total of 3,833 behaviors were recorded for the HS divers while only 2,649 behaviors were recorded for the LS divers. Differences were also evident in the nature of the behaviors. The HS divers received more praise and information from the coach. The LS divers received more criticism from the coach and exhibited more predictable behaviors than the HS divers. The interaction patterns revealed that the predominant patterns were similar for both groups, although their percentage of occurrence differed at times. The predominant pattern was 5-8-5 or coach information-giving followed by athlete predictable response followed by coach information-giving; this occurred 26% with HS and 31.3% with LS divers. The 5-5 pattern of extended information-giving by the coach occurred 21.2% with HS and 19.3% with LS divers. The pattern 8-7-2-5 or constructive criticism (7-2) following a diver's predictable response followed by information by the coach occurred equally in both groups, 17.5%. The behaviors and interaction patterns recorded differed from the patterns typically recorded for team sports athletes.

Deborah Rush
Dept. of Physical Education & Dance
Skidmore College
Saratoga Springs, NY 12866

Saturday, April 12
3:15-4:45 p.m.

HEART RATE RESPONSE DURING BASKETBALL COACHING: A CASE STUDY

Janet K. Reusser, Oklahoma State University; Steven W. Edwards, Oklahoma State University.

The purpose of this study was to examine the heart rate responses of an intercollegiate basketball coach during an actual coaching situation. As an indicator of psychological stress, heart rate was monitored by continuous telemetry during an intercollegiate game using a female coach as the subject. The 27 year old coach was deemed to be physically fit via a treadmill test given one week prior to the game. Also the subject was given Speilberger's State-Trait Anxiety Inventory (STAI) in order to assess her typical level of anxiety. Her trait anxiety T-score was 40 and her state anxiety T-score two hours prior to the game was 74. Prior to the game the Birtcher electrocardiograph and Narco telemetry transmitter were placed in operation. Continuous recording occurred from several minutes before the game until several minutes following the game. Her resting heart rate at the time of the treadmill test was 42 beats · minute^{-1}(bpm), two hours prior to the game it was 75 bpm, and at one, two and three minutes prior to tip-off her heart rate was 95, 87 and 62 bpm respectively. During the game her heart rate peaked at 140 bpm or 80% of its maximum. Other heart rate responses during the game paralleled the crucial and stressful nature of the game itself. Sudden and dramatic increases in heart rate were observed in response to quick changes in the game such as turnovers. The observed responses compare favorably with published data regarding male coaches. It was concluded that the psychological stresses associated with basketball coaching affect heart rate by elevating it in direct proportion to the amount of perceived stress in the game.

Janet K. Reusser
School of HPELS, Room 103
Oklahoma State University
Stillwater, OK 74078

Saturday, April 12
3:15-4:45 p.m.

INFLUENCE OF CAUSAL DIMENSION ORIENTATION ON SELF-CONCEPT OF ABILITY, INTRINSIC MOTIVATION AND CAUSAL DIMENSION RESPONSES.

Mary E. Rudisill, University of North Dakota.

Evidence suggests that there appears to be a linkage between self-concept of ability (SCOA) and the selection of attributions (Nicholls, 1975). Internal, controllable, unstable (ICU) attributions are chosen by individuals with High SCOA when experiencing failure, while Low SCOA individuals normally chose internal, uncontrollable, stable (IUS) attributions. Furthermore, investigations indicate that the type of causal factors an individual attributes to an outcome may enhance or hinder various cognitive and behavioral parameters (Dweck, 1975). Intrinsic motivation seems to be directly affected by the attributional process. Therefore, in order to positively affect these measures, a person must attribute failure to the appropriate attributions (ICU). This investigation was conducted primarily to compare the influence of an internal, controllable, unstable orientation with that of other orientations on self-concept of ability, intrinsic motivation, and responses to a Causal Dimension Scale. Male and female seventh, eighth and ninth grade students (N=322) responded to a SCOA questionnaire. Based on the response to this questionnaire, 42 Low and 42 High SCOA subjects were selected to participate in this study. Separately, the Low and High SCOA subjects each randomly assigned to one of three Causal Dimension orientation groups, were oriented to perceive their performance on a stabilometer balancing task as due to (1) ICU factors; (2) IUS factors; or (3) nothing in particular (NDO). Participants then received fictitious normative feedback over 15 trials, suggesting they had performed below average compared to norms of other seventh, eighth and ninth grade students. Dependent variables included (1) intrinsic motivation or persistence with the experimental task, and (2) responses to a Causal Dimension Scale. Significant results were found for the SCOA and Causal Dimension orientation factors for intrinsic motivation. More specifically, the High SCOA group persisted longer than the Low SCOA group. In addition, the subjects introducted to a ICU orientation persisted for a longer amount of time than the IUS and NDO groups. Furthermore, the results for the Causal Dimension Scale revealed that the dimensional orientations appeared to influence the internal and stable dimensions. The results were discussed in terms of the benefits of an internal, controllable, unstable dimension orientation on individuals with High and Low SCOA, intrinsic motivation, and Causal Dimension responses.

Mary E. Rudisill
University of North Dakota
Department of Physical Education
Grand Forks, ND 58202

Saturday, April 12
3:15-4:45 p.m.

CENTRAL CARDIOVASCULAR RESPONSES OF QUADRIPLEGIC SUBJECTS TO ARM EXERCISE AT VARYING LEVELS OF OXYGEN UPTAKE.

Stephen F. Figoni, University of Illinois at Urbana-Champaign.

The purpose of this study was to assess selected central cardiovascular functions of spinal cord injured, quadriplegic subjects at varying levels of oxygen uptake ($\dot{V}O_2$). Subjects included seven, untrained, male college students with C5-6 complete quadriplegia. Exercise was performed on a Monark cycle ergometer modified for arm-cranking in the sitting position. Open-circuit spirometry was used to measure $\dot{V}O_2$. Impedance cardiography and ECG were utilized to measure stroke volume (SV), heart rate (HR), and ejection fraction (EF). Calculated variables included cardiac output ($\dot{Q}$), arteriovenous oxygen difference ($(a-\bar{v})O_2dif$), end diastolic volume (EDV), and end systolic volume (ESV). The variables were determined during seated rest, two levels of submaximal exercise, and maximal exercise on 2-4 different occasions. $\dot{V}O_2$ increased linearly with power output from 0.20 L/min at rest to 0.64 L/min at 21 watts. HR and $(a-\bar{v})O_2dif$ increased linearly with $\dot{V}O_2$ from 75 bpm and 5.6 ml/100ml at rest to 122 bpm and 18.4 ml/100ml during maximal exercise. $\dot{Q}$, EF, and ESV showed little change, remaining at approximately 3.6 L/min, 60%, and 25 ml, respectively. SV and EDV decreased linearly with increasing $\dot{V}O_2$, each ranging respectively from 48 and 75 ml at rest to 28 and 50 ml at maximal exercise. Unlike able-bodied subjects, HR and SV were inversely related ($r=-.83$, $p<.05$) when $\dot{Q}$ remained constant across varying levels of $\dot{V}O_2$. Increases in $\dot{V}O_2$ appeared to be controlled by oxygen extraction by peripheral tissues in quadriplegic subjects, and not by both oxygen delivery and extraction as in able-bodied subjects. Very limited muscle mass, autonomic decentralization, restricted cardiac preload and contractility, and lack of pressor response to exercise are leading hypotheses to explain the "hypokinetic" state of the circulation of these high-level quadriplegic subjects.

Stephen F. Figoni
Department of Physical Education
University of Illinois
at Urbana-Champaign
Urbana, IL 61801

Stephen F. Figoni
329 W. Paddock Dr.
Savoy, IL 61874

Sunday, April 13
8:15-9:45 a.m.

FACTOR STRUCTURE OF ANAEROBIC FUNCTIONING IN FEMALES AND MALES.

Barry B. Shultz, University of Utah; Peter J. Maud, Columbus College; Steve C. Johnson, University of Utah.

Until recently little attention has been given to tests measuring anaerobic functioning. The purpose of this study was to determine the factor validity of several anaerobic power and capacity tests. Additionally, is the underlying factor structure of these tests similar for men and women? Active, college-aged female (*n*=68) and male (*n*=60) students were tested on six anaerobic tests. Power tests included the Margaria-Kalamen, jump and reach with Lewis nomogram, and Wingate (first 5 seconds). Capacity tests included the Wingate and the 30- and 40-second protocols of the Katch. The results were subjected to an Alpha factor analysis with varimax rotation and a .5 factor loading as the cutoff for interpretation. The solution for women produced a single factor which accounted for 69% of the variance. For the men two factors resulted and accounted for 89% of the variance. Factor 1 included the four bicycle tests and Factor 2 included the Lewis and Margaria. The inclusion of the bicycle scores relative to body weight also produced unique solutions for the men and women. The results indicated two factors for the men and three for the women with 87% and 89% of the variance accounted for. The factors seem to reflect absolute and relative anaerobic factors. For the women the relative measures formed two factors. For men, the Wingate 5-second doesn't seem to measure anaerobic power. For the women all tests measure a single dimension. The 2-3 second all out pedaling of the Wingate may have introduced a large lactic acid component for the men. The gender differences may be explained by differences in muscle mass. While studies indicate no gender differences in phosphagen stores relative to muscle mass, women have less muscle mass and thus less total phosphagen to perform work. Also, they have been shown to have lower levels of lactic acid in their blood following maximal exercise. Thus these tests may not be comparable and thus not suitable for testing gender differences.

Barry B. Shultz
Department of Physical Educ.
University of Utah
Salt Lake City, UT 84112

Sunday, April 13
8:15-9:45 a.m.

SERIAL CHANGES IN AEROBIC POWER, SKATING POSTURE, AND STRENGTH IN ELITE SPEEDSKATERS.

Carl Foster, Paul Abler, Ann Brophy, Mike Crowe, Dianne Holum, Kathleen Lemberger, Nancy Thompson, Drew Palin, University of Wisconsin Medical School (MCC), Mount Sinai Medical Center, Milwaukee, WI.

Previous studies have demonstrated the importance of several variables including aerobic power ($\dot{V}O_2$ max) and skating posture, particularly pre-extension knee angle (KA) and hip angle (HA), to performance in metric style speedskating. The approach to training taken by most skaters also assumes that strength of the hip extensors (HS) and knee extensors (KS) is important to achieving optimal values for KA and HA. This study was designed to follow serial changes in these variables during 6 months of dry land and on-ice training in members of the U.S. Speedskating Team and to evaluate how changes might influence skating performance. Skaters (N=6) were studied in June and Sept. at the start and conclusion of hard dry land training and in Dec. after 6-8 weeks of on-ice training. $\dot{V}O_2$ max was measured on both cycle ergometer (c) and slideboard (sb), a dry land training tool which mimics skating. KA and HA were measured from videotapes obtained during the $\dot{V}O_2$ max-sb study. HS and KS were taken as peak torque values obtained during Cybex studies of hip extension at 210°/s and knee extension at 240°/s. During the period of study $\dot{V}O_2$ max-c increased from 3.66 to 3.77 to 3.90 l/min for June, Sept. and Dec. respectively. $\dot{V}O_2$ max-sb changed less during this interval (3.05 to 3.09 to 3.11 l/min). Both HA (17.5° to 11.2° to 6.8°) and KA (111.3° to 103.5° to 101.5°) decreased. HS increased consistently (80.3 to 103.0 to 107.7% body weight), while KS changed less consistently (66.7 to 73.6 to 71.2% body weight). Changes in HA and KA were not significantly correlated with changes in HS and KS. Using the biomechanical model of speedskating proposed by van Ingen Schenau and Bakker (JHMS 6: 1-18, 1980), the observed changes in $\dot{V}O_2$ max-sb, HA and KA predict a 6.5% increase in skating velocity from June to Sept. and an additional 3.1% increase from Sept. to Dec., with most of the change (5.2 and 3.0%) attributable to changes in HA and KA. We conclude that training induced changes in the ability to sustain optimal values for HA and KA are primary to improvement in speedskating performance but that changes in HS and KS, per se, do not contribute to these changes.

Supported by grants from the U.S. Olympic Committee and Ross Laboratories.

Carl Foster, Ph.D.
Human Performance Laboratory
Mount Sinai Medical Center
950 N. 12th Street, P. O. Box 342
Milwaukee, WI 53201

Sunday, April 13
8:15-9:45 a.m.

THE EFFECT OF PEDALING SPEED ON VENTILATORY AND BLOOD LACTATE DYNAMICS DURING INCREMENTAL CYCLE ERGOMETER EXERCISE.

J.M. Pivarnik, University of Houston; S.J. Montain, J.E. Graves, M.L. Pollock, Universal Services Rehabilitation and Development.

The purpose of the study was to determine the anaerobic (Tan) and lactate (Tlac) thresholds and kinetics during incremental cycle ergometer exercise at different pedaling speeds. Peak $\dot{V}O_2$ measurements were obtained on 10 healthy adult male volunteers using cycle ergometer exercise performed at both 50 and 90 revolutions per minute (RPM). All subjects performed two submaximal incremental exercise tests, one at each pedal frequency. The protocol consisted of continuous pedaling for five minutes at each of six increasing intensities from 20 through 70 percent of peak $\dot{V}O_2$. Experiments were randomized and total exercise time in each was 30 minutes. Expired gases were collected continuously throughout the exercise session. Venous blood samples were obtained during the last minute of each increment. Heart rate (HR), blood pressure (BP) and perceived exertion (RPE, Borg scale) were measured midway through each of the five minute periods. There were no significant differences between peak $\dot{V}O_2$ measurements (50 RPM = 54.2 and 90 RPM = 55.9 $ml \cdot kg^{-1} \cdot min^{-1}$). During the incremental tests, $\dot{V}O_2$, $\dot{V}CO_2$, $\dot{V}e$, HR, BP, and RPE increased as a function of exercise intensity but there were no differences between experimental conditions. Tan was determined as the point of an increase in $\dot{V}e/\dot{V}O_2$ without a corresponding increase in $\dot{V}e/\dot{V}CO_2$. This occurred at 855 $kgm \cdot min^{-1}$ in the 50 RPM and 885 $kgm \cdot min^{-1}$ in the 90 RPM conditions. The difference was not statistically significant. However, both $\dot{V}e/\dot{V}O_2$ and $\dot{V}e/\dot{V}CO_2$ were less ($p < .01$) during 50 RPM than 90 RPM by the end of exercise. Tlac was determined as the point of a nonlinear increase in venous lactate concentration with increasing exercise intensity. In the 50 RPM condition, Tlac occurred at 960 $kgm \cdot min^{-1}$ as opposed to 810 $kgm \cdot min^{-1}$ in 90 RPM ($p < .01$). Additionally, lactate concentration was less ($p < .01$) at the end of exercise in 50 RPM (5.8 mmol/l) than in 90 RPM (6.7 mmol/l). The results indicate an effect of pedaling speed on the ventilatory and blood lactate changes associated with incremental cycle ergometer exercise.

James M. Pivarnik, Ph.D.
Department of HPER
University of Houston/UP
Houston, Texas 77004

Sunday, April 13
8:15-9:45 a.m.

RELATIVE EFFECTS OF WALKING AND JOGGING 12 MILES PER WEEK FOR 20 WEEKS ON CARDIORESPIRATORY, BODY COMPOSITION, PERCEIVED EXERTION, BLOOD LIPID VARIABLES IN SEDENTARY WOMEN.

Mayra Santiago, John Alexander, G. Alan Stull, Mark Hayday, Robert Serfass, Arthur Leon, University of Minnesota.

Previously sedentary women were randomly assigned to either a walking (N=9; $\bar{X}$ $\dot{V}O_2$ max = 34.96 ml·kg^{-1}·min^{-1}), jogging (N=8; $\bar{X}$ $\dot{V}O_2$ max = 33.94 ml·kg $^{-1}$·min^{-1}), or non-exercise control (N=8; $\bar{X}$ $\dot{V}O_2$ max = 34.88 ml·kg $^{-1}$·min^{-1}) group for 20 weeks of training. Experimental subjects either walked or jogged 3 miles, 4 times per week under supervision on motorized treadmills. Initial training intensity was 62 percent $\dot{V}O_2$ max for the walkers (3.3 MPH, 6% grade) and 89 percent $\dot{V}O_2$ max for the joggers (5 MPH, 0% grade). Intensity was increased by one MET at the midpoint of training. Walkers exercised for 51 to 55 minutes and joggers for 32 to 36 minutes per session. Total energy expenditures per session were similar for the two experimental groups. Distance remained the same for both groups throughout training. All subjects had 100% compliance to the training. Analysis of variance (ANOVA) was performed on all dependent variables with subsequent analysis using one-way ANOVAs and Tukey's w-procedure. $\dot{V}O_2$ max increased ($p<.05$) to 42.2 ml·kg^{-1}·min^{-1} (21%) for the walkers and to 44.5 ml·kg^{-1}·min^{-1} (31%) for the joggers. $\dot{V}E$ max increased ($p<.05$) from 80.52 to 94.94 l·min^{-1} (18%) for the walkers and 69.46 to 90.54 l·min^{-1} (30%) for the joggers. There were no significant differences in $\dot{V}O_2$ max and $\dot{V}E$ max between the walkers and joggers. Submaximal $\dot{V}O_2$, $\dot{V}E$, and double product decreased significantly as a result of training for the two experimental groups. Submaximal heart rates of the joggers, but not the walkers, were significantly lower than the controls; however, resting and maximal heart rates were not significantly different. Rating of Perceived Exertion (Borg's Scale) during the post-test to a standardized submaximal work load was lower ($p<.05$) in joggers than walkers. Neither walking nor jogging resulted in a significant change in body weight or percent body fat by underwater weighing or sum of skin-folds. There were no significant differences between groups in lipid profile. There were more injuries associated with jogging than walking. This study demonstrates that significant increases in cardiorespiratory fitness are possible with walking and jogging 3 miles, 4 times per week at comparable energy expenditures.

John F. Alexander, Ph.D.
School of Physical Education & Rec
University of Minnesota
1900 University Avenue Southeast
Minneapolis, MN 55455

Sunday, April 13
8:15-9:45 a.m.

CHANGES IN SERUM LIPIDS, AORTIC TISSUE CHOLESTEROL AND ATHEROSCLEROTIC LESION DEPOSITION IN RABBITS WITH EXERCISE.

R. C. Westerfield, The University of Alabama; F. S. Bridges, Louisiana State University.

The effects of a moderate aerobic exercise program on serum lipid levels, aortic tissue cholesterol levels and the extent of atherosclerotic lesion development were determiend in rabbits. Forty New Zealand White Rabbits, 120 days old, were randomly assigned to exercise or non-exercise groups. The exercise group received daily aerobic exercise on an animal treadmill for 180 days. Serum samples were obtained every 30 days throughout the study. Lipid profiles and levels (MG%) were determined through the Vertical Spin Auto Profiler (VAP) method. Thoracic aortic segments from the 300 day old subjects were excised and evaluated for tissue cholesterol and atherosclerotic lesions. Esterified, free and total cholesterol in aortic tissue were determined through saponification after thin-layer chromatographic separation. Separate aortic segments were longitudinally dissected, stained with Sudan IV, mounted on corkboard and photographed in color. The percent of total atherosclerotic lesion involvement per specimen was determined from the photograph (2.5x) by morphometric methods. Statistical analysis indicated the exercise group was significantly ($P < .01$) lower in: aortic tissue cholesterol levels, atherosclerotic lesion involvement, low density lipoprotein levels, total serum cholesterol levels, and low density lipoprotein/high density lipoprotein ratio. There were no significant differences in high density lipoprotein, very low density lipoprotein or triglycerides. Findings support the inhibitory role or exercise in tissue cholesterol accumulation, atherosclerotic lesion development and producing changes in certain serum lipoproteins.

R. Carl Westerfield
104 Moore Hall, P. O. Box 1967
The University of Alabama
University, AL 35486

Sunday, April 13
8:15-9:45 a.m.

FORMALIZED BREATHING PATTERNS AS AN INFLUENCE IN ACID BASE BALANCE IMMEDIATELY FOLLOWING A KARATE KATA.

Teresa A. Noakes, Southern Illinois University,
Ronald G. Knowlton, Southern Illinois University,
Ronald K. Hetzler, Southern Illinois University

Formalized breathing techniques are taught in Karate in order to maximize power and reduce fatique. Kata, which incorporates these techniques, is a predetermined sequence of arm and leg movements performed at a high intensity for a short period of time. The purpose of this study was to determine if Karate practitioners could counterbalance metabolic acidosis through respiratory compensation during a beginning level Kata, Ki Cho I. Six subjects, 3 black belts and 3 brown belts, were asked to perform Ki Cho I, at competitive intensity. Arterialized finger capillary blood was drawn prior to and immediately after Kata for the determination of pH, bicarbonate, base excess, and PCO_2 by use of the Siggaard Andersen Curve Nomogram (Radiometer pH Meter 27 and Astrup AMT-1 Micro tonometer). Heart rate was obtained by an EKG (CM-5 configuration) and lactate was measured by use of an enzymatic procedure (Boehringer-Mannheim). Variables were tested for significance utilizing *t* test for paired comparisions. Significance ($p < 0.05$) was achieved for all variables. Mean pre and post values were: pH 7.38 to 7.33; base excess -0.33 to -2.33; bicarbonate 24 meq/L to 22.8; PCO_2 41.3 mmHg to 47.8; lactate 11.2 mg% to 22.8; heart rate 77.3 to 133. The mean Kata time was 18.2 seconds. It was concluded that respiratory compensation does not occur and instead respiratory acidosis contributes to the metabolic acidosis. The implication is that the formalized breathing pattern may be suitable in tournaments where a single Kata is required, but detrimental under contions where repeated Katas are required.

Teresa A. Noakes
Southern Illinois University-
Carbondale
Carbondale, IL 62901

Sunday, April 13
8:15-9:45 a.m.

EFFECTS OF UPPER EXTREMITY LOADING ON SUBMAXIMAL AND MAXIMAL CARDIORESPIRATORY AND METABOLIC FUNCTION.

Vernon Bond, Basdeo Balkissoon, Deborah Murphy, and Royie Brownlow, Howard University, Washington, D.C.

Running with hand weights is a practice of upper extremity exercise which has experienced a rapid growth due to claims that it increases the effectiveness of aerobic training. The effect of treadmill running with no load and a load of 1.36 Kg added to the hands was investigated in seven healthy male subjects. The treadmill protocol consisted of running at a constant speed of 160 $m \cdot min^{-1}$ with a 1.7% grade increase each minute until maximal fatigue. ANOVA and post hoc tests ($\alpha = .05$) revealed that submaximal measures of heart rate, ventilation ($\dot{V}E$), breathing frequency, and ventilatory equilivent for oxygen ($\dot{V}E/\dot{V}O_2$) were significantly increased with added load, with no measured difference in oxygen uptake ($\dot{V}O_2$) and caloric expenditure. Results indicated maximal measures of heart rate, $\dot{V}E$, $\dot{V}O_2$, $\dot{V}E/\dot{V}O_2$, and caloric expenditure were not significantly different when comparing the no-load and load conditions. Measures of breathing frequency at maximal effort were significantly increased with loading. The anaerobic threshold (AT) occurred at 76.6 and 76.0% of the $\dot{V}O_2$ max for the no-load and load test respectively. While there were no significant differences in $\dot{V}O_2$ and percent of $\dot{V}O_2$ max at AT between the no-load and load conditions, onset of AT was significantly increased with added load. It was concluded that upper extremity loading exerts no influence on maximal aerobic capacity during treadmill running, and an aerobic training regimen should not include the practice of upper extremity loading.

Vernon Bond
Dept. of Physical Education
Howard University
Washington, D.C. 20059

Sunday, April 13
8:15-9:45 a.m.

EFFECTS OF N,N-DIMETHYLGLYCINE ON PHYSIOLOGICAL RESPONSE AND PERFORMANCE IN TRAINED RUNNERS. P. Bishop, J. Smith, and B. Young; The University of Alabama.

Dimethylglycine (DMG), a compound found in certain beans and seeds, and in pangamic acid, has been found to reduce lactic acid levels in rats exposed to severe surgical stress, and in horses engaged in race training, and has been shown to increase the immune response in humans. The purpose of this study was to assess the effects of a single acute dose of DMG on the physiological response and performance of trained runners. A double-blind, cross-over, counter-balanced research study was used to assess the effects of ingestion of 125 mg of DMG immediately prior to a graded treadmill test on 3 female and 13 male trained runners. In treadmill running, no significant differences ($p > .05$) between DMG and placebo trials were observed for maximum ventilation, maximal oxygen uptake, heart rate, or total run time. No significant differences in respiratory exchange ratio, Borg scale rating, or oxygen uptake were observed at the submaximal workload of 188 m·min^{-1} and 4% grade. Although one previous research study reported that chronic ingestion of a DMG-containing compound improved performance in trained runners, DMG ingestion immediately prior to running does not significantly improve running performance.

This research was supported by a grant from the Univeristy of Alabama College of Education.

Dr. Phillip Bishop
P. O. Box 1967
The University of Alabama
University, AL 35486

Sunday, April 13
8:15-9:45 a.m.

INGESTION OF CARBOHYDRATE SOLUTIONS DURING EXERCISE: EFFECTS ON CYCLING PERFORMANCE AND GLYCOGEN UTILIZATION

Michael G. Flynn; David L. Costill; William J. Fink; John A. Hawley; P. Darrell Neufer; Roger A. Fielding; Mark D. Sleeper, Ball State University.

Solutions low in carbohydrate (CHO) have been shown to be effective in replacing sweat losses during exercise in the heat. It has not been determined, however, if these solutions can spare muscle glycogen or improve performance. Eight well-trained male cyclists (VO_2 max 4.66 ± 0.43 l/min; $\bar{X} \pm$ S.E.) participated in four trials. Each trial was preceded by a 60 min "depletion ride" at 70% $\dot{V}O_2$ max (48 h prior) and a high CHO diet. The trials consisted of two hours of cycling on a Fitron Cycle ergometer interfaced to an Apple microcomputer to calculate the work output. The cyclists were asked to complete as much work as possible in the two hour period. At the start of each trial and every twenty minutes thereafter, the subjects consumed 150 ml of one of four drinks. The composition of the drinks was as follows: H_2O (artificially flavored and sweetened); 5 g/100 ml maltodextrin and 5 g/100 ml fructose (MF); 7.7 g/100 ml maltodextrin and 2.3 g/100 ml high fructose corn syrup (MHFC); 3 g/100 ml maltodextrin and 2 g/100 ml glucose (MG). A muscle sample was obtained prior to exercise and after 90 minutes of cycling. Blood samples were obtained at the start of exercise and at thirty minute intervals. There was no difference in the amount of work completed between the four trials. Muscle glycogen levels were not different at the start of the exercise or at 90 min. Blood glucose was greater at 60 min in the MG (5.70 ± 1.02 mmoles/l), MHFC (6.05 ± 1.52) and MF (6.03 ± 1.18) compared to H_2O (4.97 ± 0.54)($P < 0.05$). At 90 minutes the blood glucose was significantly elevated during the MF and MHFC trials. At the completion of the exercise period blood glucose levels were significantly elevated only in the MF trial. No differences were observed between trials in blood lactate levels, serum glycerol, respiratory exchange ratio or the subjects' perception of effort. These data suggest that when the initial glycogen levels are elevated, CHO ingestion during exercise does not result in a significant sparing of muscle glycogen or an improvement in cycling performance during 2 h of exercise.

Michael G. Flynn
Human Performance Laboratory
Ball State University
Muncie, IN 47306

Sunday, April 13
8:15-9:45 a.m.

EFFECTS OF EXERCISE MODE AND CARBOHYDRATE COMPOSITION ON GASTRIC EMPTYING OF ATHLETIC DRINKS. P. Darrell Neufer; David L. Costill; William J. Fink; John P. Kirwan; Roger A. Fielding; Michael G. Flynn, Ball State University.

The purpose of this study was to evaluate the gastric emptying characteristics of athletic drinks of varied CHO composition and concentrations under both resting and exercise (50-70% VO_2 max) conditions. Twenty-five runners ingested 400 ml of a solution in one or more of a series of trials followed by either 15 min seated rest, 15 min running, or 15 min cycling. The drinks tested were as follows:

	Code	Rest	Running	Cycling
H_2O	W	X	X	
3% Maltodextrin + 2% Glucose (Max)	MX	X	X	
5% Maltrin	ML	X		
7.1% Exceed	EX	X	X	
5.5% Maltodextrin + 2% Glucose	MG		X	
5.5% Maltodextrin + 2% Fructose	MF		X	
5% Maltrin + 5% Fructose	MLF		X	X

At rest, the subjects emptied W significantly ($p<.05$) faster than all other drinks. During the running trials, the subjects also emptied W significantly faster than all other drinks. In the running trials, the volume of gastric residue of MG (221.7 ± 42.5 ml) was significantly greater than MF (185.7 ± 34.9 ml) and EX (167.3 ± 57.2 ml), suggesting the inhibitory role of glucose on gastric emptying. Running resulted in significantly less volume of gastric residue of W, MX, and EX (103.4 ± 73.7, 180.3 ± 61.8, 167.3 ± 57.2 ml) as compared to the corresponding drinks at rest (200.3 ± 68.7, 287.6 ± 62.0, 272.0 ± 70.7 ml). Although not significant, MLF tended ($p<.07$) to be emptied faster during running as compared to cycling. These results suggest an advantage for including maltodextrin and fructose as CHO sources in athletic drinks. Furthermore, the rate of gastric emptying is enhanced while running, possibly due to increased mechanical movement of fluid within the stomach.

Max drink, Coca-Cola Foods. Exceed, Ross Laboratories. Columbus, OH

P. Darrell Neufer
Human Performance Laboratory
Ball State University
Muncie, IN 47306

Sunday, April 13
8:15-9:45 a.m.

SERUM AND SALIVARY CORTISOL RESPONSE TO EXERCISE. Patrick J. O'Connor and Donald L. Corrigan, Purdue University.

The purpose of this study was to compare serum and salivary cortisol responses to exercise. Eight males (aged 20-27) volunteered to participate in the study. The subjects exercised on a bicycle ergometer at 75% of their previously determined $\dot{V}O_2$max for 30-min on three consecutive days. On each of these days either blood, saliva or both blood and saliva were obtained before (-15 and 0-min), during (15-min) and following (30 and 45-min) exercise. Blood and saliva were also collected on a fourth day while the subjects rested quietly, and this served as a control treatment. The order in which the subjects underwent these four conditions was randomized apriori. Submaximal exercise elicited a significant ($p \leq 0.05$) increase in both serum and salivary cortisol above control levels for the two sampling periods following exercise. Significant correlations ($p \leq 0.01$) were observed between serum and salivary cortisol at: -15 (r = .89), 0 (r = .60), 15 (r = .72), 30 (r = .90) and 45 min (r = .93) of exercise. Furthermore, the salivary cortisol response to submaximal exercise exhibited a remarkably similar pattern to serum cortisol. The results of this experiment indicate that salivary cortisol appears to be a valid measure of cortisol response to exercise.

Patrick J. O'Connor
University of Wisconsin-Madison
Department of Physical Education
Madison, WI 53706

Sunday, April 13
8:15-9:45 a.m.

COMPARISON OF THE YMCA SUBMAXIMAL BICYCLE ERGOMETER TEST TO MEASURED PEAK OXYGEN CONSUMPTION.

Barbara L. Holmes, San Jose State University; Carol L. Christensen, San Jose State University

The purpose of this study was to compare the prediction of maximal oxygen consumption (VO2max) as determined by the YMCA submaximal bicycle ergometer test to a direct measurement of peak oxygen consumption (VO2peak). Nineteen female subjects, ages 23 to 44 (mean 33.1) years, performed the YMCA test followed, without interruption, by a graded exercise test to voluntary exhaustion (peak VO2). Heart rates were monitored continously and recorded during the last 10 seconds of each minute and VO2peak was determined by standard open circuit calorimetry. Pearson Product Moment Correlation was .515 and a correlated t-test showed no significant difference between predicted VO2 max and actual VO2peak. The absolute individual percent error in predicted VO2max relative to measured VO2peak was 19.8%. In addition, for over half of the subjects, the YMCA test overpredicted from 4.7 to 74.5 percent. The test had a tendency to overpredict for less fit individuals and underpredict for more fit individuals. It was concluded that the YMCA test is a poor predictor of VO2peak due to its low correlation and large individual percent error when compared with measured VO2peak. While this test has advantages, its use should be carefully considered and the results interpreted cautiously, keeping in mind the possible error.

Barbara L. Holmes
c/o C. L. Christensen
Department of Human Performance
San Jose State University
San Jose, CA 95192

Sunday, April 13
8:15-9:45 a.m.

Relationship Between Repetitions and Selected Percentages of One Maximum Repetition. Werner W.K. Hoeger, David R. Hopkins, Sandra L. Barette, and Douglas F. Hale. Univ. of Texas, Permian Basin.

In this study, 129 individuals were tested to determine the number of repetitions they could perform at 40, 60, and 80 percent of one repetition maximum (1 RM) for each of seven specified weight training lifts. The subjects were grouped into four categories: untrained males (n= 38), untrained females (n= 40), trained males (n= 25), and trained females (n= 26). The means and standard deviations for the number of repetitions performed at the selected percentages of 1 RM were calculated using the Statistical Analysis System (SAS) package. A one way Manova, using the Wilks' criterion with the seven specified weight training lifts as the independent variables and the number of repetitions performed at the selected percentages of 1 RM as the dependent variables was performed to test for significant differences in the number of repetitions that the subjects could perform at selected percentages of the 1 RM among the seven specified lifts. The Duncan Multiple Range Analysis was then performed to identify the significant differences in the number of repetitions among the lifts. Another one way Manova was conducted to test for significant effects of training between untrained and trained males, and untrained and trained females. The results of this research indicated that there is a significant difference ($p=<.0001$) in the number of repetitions that individuals can perform at the selected percentages of 1 RM among the seven weight training lifts, as well as in the number of repetitions performed at these percentages across lifts. When comparing untrained and trained males, a significant difference ($p= <.05$) was found in the number of repetitions performed at the selected percentages of 1 RM on five of the lifts. When comparing untrained and trained females, a significant difference ($p=<.0001$) was found for all seven lifts. The findings of this study indicate that a given number of repetitions is not always associated with the same percentages of the 1 RM when performing different lifts. Neither can the prediction of the 1 RM be generalized on the number of repetitions performed. The findings further indicate that if 10 or less repetitions maximum should be used to stimulate strength development, a minimum of 80 percent of the 1 RM, and not 60 percent as reported by several authors, must be used in most lifts to obtain strength gains.

Werner W.K. Hoeger
Faculty of Physical Education
University of Texas, Permian Basin
Odessa, Texas 79762-8301

Sunday, April 13
8:15-9:45 a.m.

AN EVALUATION OF MEASUREMENT ERROR OF THE CYBEX II ISOKINETIC DYNAMOMETER. K.J. Grump, M.G. Bemben, & B.H. Massey. Physical Fitness Research Laboratory, University of Illinois at Urbana-Champaign.

Three general sources of data variation are to be considered relative to all data collection: 1) intersubject variability, 2) intrasubject variability, and 3) measurement error. Measurement error, the potential intrinsic variation associated with any instrumentation, should be examined and minimized. This investigation assessed the degree of measurement error inherent in the Cybex II dynamometer, specifically, velocity and damping characteristics of the instrument. Following calibration of the dynamometer, the stability of velocity settings was examined using a system of photoelectric cells and timers. The length of the T-Bar was set at 2.5 ft. producing a distal force of 2.4 lbs. with the bar horizontal to the floor. The T-Bar was allowed to fall at four different velocity settings (30^o, 60^o, 180^o and 240^o per second) with six loads (0, 5, 25, 35, 50 and 70 lbs.), resulting in theoretical peak torques of 6, 18, 68, 93, 131, and 181 ft./lbs., respectively. Time of movement through a 60^o arc, 30^o on either side of the horizontal, was recorded. Also assessed by repeated trials was the effect of damping on torque recordings, and the angles at which peak torque occurred. Assessment of velocity variations produced coefficients of variation of 0.33%, 0.92%, 1.16%, and 2.94%, at velocity settings of 30^o, 60^o, 180^o, and 240^o per second, respectively. Increasing the damping from 0 to 4 slowed the stylus response and shifted the torque curve to the right indicating peak torque occurred later in the range of movement. In addition, the peak torque values were significantly decreased. These findings agree, in general, with those of Sinacore et al. (1983). In the present study, however, a consistent trend in decrement of torque values with increased damping was noted. It was evident, also, that both peak torque and the T-Bar angle at which peak torque occurred was most accurately recorded at the damping setting of 4. These findings using our instrument with an analogue recorder were checked using a new Cybex Data Reduction Computer in another laboratory. The findings were the same. The implications of this study are that: 1) variation in velocity at settings below 180^o per second are well within the acceptable tolerance level of the equipment, 2) calibration should be at the damping setting that is to be used during testing, and 3) the damping setting of 4 produces the most accurate results.

Kevin J. Grump
Physical Fitness Research Laboratory
906 S. Goodwin Ave.
University of Illinois
Urbana, IL 61801

Sunday, April 13
8:15-9:45 a.m.

A PHYSIOLOGICAL AND BIOMECHANICAL COMPARISON OF ABLE-BODIED PERSONS TO WHEELCHAIR DEPENDENT PERSONS DURING WHEELCHAIR ERGOMETRY.

Ronald K. Hetzler, Ronald G. Knowlton, Joseph Hamill, Teresa A. Noakes, Teresa Schneider; Southern Illinois University.

Frequently, able-bodied (AB) subjects are used to determine the efficiency of wheelchair locomotion without consideration of physiological or biomechanical differences that may exist between AB and wheelchair dependent (WCD) persons. The purpose of the present study was to test for these differences across a wide range of workloads using a wheelchair ergometer. Five WCD subjects, average confinement 5.6 years with lesion levels from C5 to T12, were compared to five untrained AB subjects. The initial power output was 12.8 watts with successive increments of 6.9 watts. Between bouts the subjects rested until their heart rates were less than 100 bpm. Expired air was metered and collected during minutes 4-6 at each power output. A 16mm Locam camera was used to film at 3.5 minutes of each bout at a varified speed of 100 frames/second. The film was digitized with a Numonics Digitizer interfaced to an Apple II+ computer. Joint centers of the shoulder, elbow, wrist and third metacarpalphalangeal joint were digitized, and from these the following biomechanical variables were calculated: initial angles of the shoulder (IAS), elbow (IAE), and wrist (IAW); final angles of the shoulder (FAS), elbow (FAE), and wrist (FAW); minimum angle of the shoulder (MAS), elbow (MAE), and wrist (MAW); range of motion of the shoulder (ROMS) and elbow (ROME); and total time of contact on the wheel (TTC). The metabolic variables were analyzed across workloads with a _t_-test for independent samples. No significant differences existed for metabolic data at 0, 12.8, or 19.7 watts. Significant differences between groups for net mechanical efficiency (NEFF) occurred at 26.6, 33.5 and 40.4 watts ($p < 0.05$). At a power output of 40.4 watts the mean (±SEM) values for NEFF were 9.69±0.94% and 12.2±0.43% for AB and WCD subjects respectively. A stepwise regression to maximize R^2 was conducted using NEFF as the dependent variable and the biomechanical variables as the independent variables. The best model to predict NEFF for AB was: NEFF = 39.3-0.15 (MAS)-0.16(MAE)-4.43(TTC); $R^2 = 0.58$; $p < 0.05$. For WCD the best model was NEFF = 9.98 + 0.15 (IAE) - 0.47 (IAW) + 1.34 (TTC); $R^2 = 0.50$; $p < 0.05$. It was concluded that because of biomechanical differences, AB persons provide a reasonable model to study wheelchair efficiency only at low workloads.

Ronald K. Hetzler
Department of Physical Education
Southern Illinois University
Carbondale, IL 62901

Sunday, April 13
8:15-9:45 a.m.

THE COVARIATE INFLUENCE OF AEROBIC CAPACITY ON STRUCTURAL AND COMPOSITIONAL FACTORS RELATED TO MIDDLE DISTANCE RUNNING PERFORMANCE.

T.J. Housh, Portland State University; W.G. Thorland, U.S. Sports Academy, Mobile, AL; G.O. Johnson, R.A. Hughes, C.J. Cisar and C.J. Ansorge, The Center for Youth Fitness and Sports Research, University of Nebraska-Lincoln.

The purpose of this study was to determine the relationships between structural and compositional variables and middle distance (2-mile) running performance independent of the covariate influence of aerobic capacity. Thirty-nine males (age X ± SD = 23.30 ± 3.72 yrs) volunteered as subjects. All subjects completed a timed 2-mile run on the same track. The variables measured included aerobic capacity using standard treadmill protocal (VO_2 max, 4.45 ± 0.49 lBTPS), relative fat from underwater weighing with correction for residual lung volume using oxygen dilution (RF, 12.28 ± 3.82 percent), fat-free body weight (FFB, 62.66 ± 6.49 kg), height (HT, 177.99 ± 6.01 cm), fat-free body weight/height (FFB/HT, 0.35 ± 0.03 kg/cm), body weight (BW, 71.53 ± 7.70 kg), and ponderal index (PI, 42.96 ± 1.48, $HT/\sqrt[3]{BW}$). Zero-order correlations between 2-mile run times and VO_2max, HT, BW,RF,FFB,FFB/HT, and PI were $r=-0.39$, 0.01, 0.48, 0.49, 0.30, 0.35, and -0.49 respectively ($r=0.31$, $p < 0.05$). First order partial correlations between 2-mile run times and HT,BW,RF,FFB, FFB/HT, and PI controlling for the influence of VO_2max resulted in values of $r=0.16$, 0.78, 0.42, 0.69, 0.73, and -0.58 respectively. The partial correlations accounted for 3 to 61% of the residual variance in 2-mile run times. The results of this study indicate that structural and compositional variables influence middle distance running performance independent of the covariate influence of oxidative metabolic considerations. Therefore these factors may be of value in accounting for the performance differences between competitors in middle distance running events.

Dr. Terry Housh
Health and Physical Education
Portland State University
P.O. Box 751
Portland, OR 97207

Sunday, April 13
8:15-9:45 a.m.

A DOCUMENTARY ANALYSIS OF RESEARCH PRESENTATIONS IN ADAPTED PHYSICAL EDUCATION AT NATIONAL AAHPERD CONVENTIONS: 1980-1985. Rose M. Antony, Texas Woman's University

The purpose of this study was to provide a documentary analysis of adapted physical education (APE) presentations made at the national AAHPERD conventions from 1980 through 1985. Of the 973 research papers published during the past 5 years in *AAHPERD Abstracts of Research Papers*, 95 (10%) were identified as primarily APE in nature. Presentations were analyzed in terms of gender and geographic location of senior authors, method of research used, focus of investigation, and handicapping condition and age of subjects. APE papers accounted for approximately 10% of the total papers presented from 1980 to 1985, ranging from 6% in 1982 to 16% in 1984. Most of the presentors were male (*M* = 60%) except in 1980 (*M* = 46%). AAHPERD districts represented were the Southern (36%), Midwest (31%), Southwest (21%), Eastern (14%), Central (7%), and Northwest (1%). Papers presented were mostly descriptive in 1980 (55%) 1983 (62%), and 1984 (56%) and mostly experimental in 1982 (67%) and 1985 (75%). Subject matter was distributed as follows: attitudinal and psychological aspects (48%), motor functioning (31%), and fitness (21%). Handicapping conditions of subjects were mentally retarded (31%), other health impaired (16%), orthopedically impaired (13%), low skilled (7%), visually impaired (6%), learning disabled (5%), emotionally disturbed (5%), auditory impaired (1%), and cerebral palsied (1%). Subjects were mostly at the elementary age level (60%). The current study provided insight into the body of knowledge being ammassed in adapted physical education. Upon the basis of findings, recommendations will be made concerning needed research in this specialization.

Rose M. Antony
PO Box 23717, TWU Station
Texas Woman's University
Denton, TX 76204

Sunday, April 13
10:15-11:45 a.m.

MOOD PROFILES OF VISUALLY IMPAIRED AND SIGHTED BEEP BASEBALL PLAYERS.

James V. Mastro, Texas Woman's University; Maria Y. Canabal, Texas Woman's University; Ron French, Texas Woman's University.

Some differences have been reported in the literature between visually impaired and sighted athletes on selected psychological characteristics. One possible reason for this difference could be that visually impaired and sighted athletes had been administered psychological instruments prior to competing in different sports and settings. Visually impaired athletes typically compete in multiple events sanctioned by sports organizations for the visually impaired, whereas sighted athletes compete in single events organized by able-bodied sports federations. Beep baseball is the only sport where visually impaired and sighted players compete for the same team in a game similar to baseball. Therefore, the purpose of this study was to compare psychological mood profiles of beep baseball players who competed in the 1985 National Beep Baseball Association World Series Tournament held in Minneapolis. Subjects were 81 visually impaired and 39 sighted players representing 21 regional teams who were administered the Profile of Mood States (POMS) within 24 hrs prior to their first game. The POMS is a 65 adjective self-report instrument factored into six mood dimensions: tension, depression, anger, vigor, fatigue, and confusion. Morgan in 1974 and 1980 has expoused that able-bodied athletes exhibit an "iceberg profile" compared to college norms (i.e., Higher than average on vigor and lower on the remaining dimensions) which is indicative of positive mental health. Although the data analyzed with a multivariate t test program yielded a nonsignificant overall difference ($p=.205$), significant univariate differences were revealed between visually impaired and sighted players on tension, $t(108.5)=2.66$, $p=.009$ and depression, $t(112.5)=2.04$, $p=.044$. Visual inspection of T scores revealed an "iceberg profile" in both groups. Based on these results, visually impaired and sighted athletes competing together seem to have similar mood profiles except in tension and depression.

James V. Mastro, PhD
Texas Woman's University
Box 23717 TWU Station
Denton, TX 76204

Sunday, April 13
10:15-11:45 a.m.

COLORS SEEN BEST BY VISUALLY IMPAIRED ATHLETES: IMPLICATIONS FOR COACHING.

Rosanna Copeland, Claudine Sherrill, Texas Woman's University.

The purpose of this study was to determine if there would be a difference in color preference for clarity in seeing indoors and/or outdoors by visually impaired athletes representing three different United States Association for Blind Athletes (USABA) classifications: (a) B-1, no light perception at all in either eye up to light perception, but inability to recognize the shape of hands in any direction and at any distance, (b) B-2, ability to recognize hand shapes up to a visual acuity of 2/60 and/or a visual field up to 5 degrees, and (c) B-3, visual acuity better than 2/60 and up to 6/60 and/or a visual field of 5-20 degrees (USABA, 1986). The population studied was 207 athletes, ages 17 to 60 years, who participated in the seventh USABA National Championships at the University of Montana. The sample included 61 subjects, each of whom was interviewed extensively. The data collection instrument was the Disabled Athlete Sport Inventory (DASI) (Sherrill, 1983). As part of the DASI, respondents were asked to list the two indoor colors they saw best and the two outdoor colors they saw best. Data were collected also on cause of blindness, age at which blindness occurred, and several other variables hypothesized to be related to colors seen best. Data for each question were analyzed using chi square. There was no significant difference found between the three classes on indoor color preference ($\chi^2(16, \underline{n} = 70) = 21.76$, $\underline{p} = .151$), with white and blue seen best by most athletes. There was a significant difference in outdoor colors seen best, ($\chi^2(16, \underline{n} = 69) = 35.21$, $\underline{p} = .004$). The B-1 athletes indicated black and red; the B-2 athletes indicated white and red; and the B-3 athletes selected green and red. Correlations between colors seen best and selected other variables indicate the need for physical educators to better understand the visual characteristics of blind athletes and to adapt the environment accordingly.

Rosanna Copeland
P.O. Box 22055
TWU Station
Denton, Texas 76204

Sunday, April 13
10:15-11:45 a.m.

PHYSICAL FITNESS AND EDUCATIONAL ENVIRONMENT OF THE AUDITORY IMPAIRED.

Joseph P. Winnick, SUNY, College at Brockport; Francis X. Short, SUNY, College at Brockport.

This study compared the physical fitness of adolescents (aged 10-17) with auditory impairments from institutionalized and non-institutionalized educational environments. An institutionalized educational environment included only youngsters with auditory impairments and a non-institutionalized educational environment included both hearing and auditory impaired youngsters. A further distinction was made between resident and non-resident institutionalized adolescents. An auditory impairment was essentially defined as a hearing loss of 27 db or greater; both hard of hearing and deaf youngsters served as subjects. Subjects were 599 institutionalized resident (IR), 318 institutionalized non-resident (IN), and 128 non-institutionalized (NI) adolescents. All subjects were administered the six-item UNIQUE Physical Fitness Test battery (Winnick and Short, 1985). Data were analyzed using multivariate ($p<.05$) and univariate ($p<.01$) ANOVA techniques. Results indicated institutionalized subjects generally outperformed non-institutionalized subjects on four of the six items in the battery. No significant differences were found for skinfolds ($p=.268$) or for sit and reach ($p=.019$). The performance of NI subjects on sum of grip strength, sit-ups and 50-yard dash was generally inferior to both groups of institutionalized subjects. Significant educational environment differences were found for males only on the long distance run; IR males attained significantly higher scores then either IN or NI males. Where differences were significant, therefore, at least one of the institutionalized groups made better scores than the NI group. Although some isolated differences were noted between IR and IN subjects, no significant differences between these groups were found for the majority of the comparisons made. These data suggest that greater attention needs to be given to the physical fitness of adolescents with auditory impairments in non-institutionalized educational settings.

Joseph P. Winnick
Department of Physical Education
State University of New York
College at Brockport
Brockport, NY 14420

Sunday, April 13
10:15-11:45 a.m.

THE RELATIONSHIP OF POSTROTATORY NYSTAGMUS DURATION TO BALANCE AND FINE VISUAL-MOTOR COORDINATION AMONG NORMAL, LEARNING DISABLED, AND MILDLY MENTALLY HANDICAPPED CHILDREN.

Ruth L. George, Inter American University; Paul Surburg, Indiana University; Hal Morris, Indiana University.

The purpose of this study was to examine the relationship of postrotatory nystagmus duration to selected measures of static balance, dynamic balance, and fine visual-motor coordination among normal, learning disabled (LD), and mildly mentally handicapped (MMH) children, and also to determine if the nystagmus and motor performance measures differentiated among the three groups of subjects. Ninety male and female subjects ages 7 through 9 years were randomly selected, with 30 subjects representing each group. Subjects were administered twice a battery of tests consisting of one measure of nystagmus duration, three measures of static balance, and two measures of fine visual-motor coordination. Testing instruments utilized were the Southern California Postrotary Nystagmus Test, the Fregly and Graybiel Ataxia Test Battery, the rotary pursuit, and the steadiness groove. The relationship of nystagmus duration to the motor performance variables was analyzed separately for each group using multiple regression techniques, while multiple discriminant function analysis was utilized to provide information about group differences. The .05 alpha level was selected to determine statistical significance. It was found that nystagmus duration was not related to any of the motor performance variables. The variables were found to discriminate among the three subject groups. The LD and MMH groups exhibited a shorter nystagmus duration than the normal group. Performance of the normal group exceeded that of the LD and MMH groups on all of the motor performance variables except one measure of dynamic balance. The MMH group demonstrated superior balance skills as compared with the LD group on the one measure of dynamic balance which contained a directional component. The LD group demonstrated superior fine visual-motor skills as compared with the MMH group. It was concluded that postrotatory nystagmus duration is not related to the performance of balance and fine visual-motor skills, but that LD and MMH children exhibit a shorter duration of postrotatory nystagmus as compared with normal children. Also, LD and MMH children demonstrate inferior balance and fine visual-motor skills as compared with normal children.

Ruth L. George
Department of Physical Education
Inter American University
San Germán, Puerto Rico 00753

Sunday, April 13
10:15-11:45 a.m.

EFFECTS OF OCCURRENCE UNCERTAINTY AND TIME UNCERTAINTY UPON REACTION, MOVEMENT AND RESPONSE TIMES OF MILDLY AND MODERATELY MENTALLY RETARDED PERSONS. Paul R. Surburg, Indiana University.

The use of catch-trials in reaction time (RT) experiments is a common protocol and may be used to delve into certain aspects of the psychomotor process such as anticipation and preparation (Naatanen, 1972). No studies, to date, have investigated the effects of occurrence uncertainty (catch-trials) and time uncertainty (preparatory intervals) upon RT, movement time (MT) and response time (RpT) of mildly (MiR) and moderately mentally retarded subjects (MoR). Twenty MiR adolescents, an equal number of MoR subjects and 20 non-retarded peers from Bloomington High School North participated in this study. Dependent variables were measured in the following manner: subject depressed a button following a ready signal, released this button after the onset of a light stimulus (RT) and touched a target disc 48 cm. from the bottom (RpT). Movement time was ascertained by subtracting RT from RpT. Preparatory intervals of 1.5, 3.0 and 4.5 seconds were randomly presented to all subjects. For each intellectual stratum, subjects were randomly assigned to a no catch-trial group or a 30% catch-trial group. A catch-trial consisted of a warning signal without subsequent stimulus. Data were collected over a four day testing period with 21 trials each day. A four-way ANOVA (intelligence x catch-trial x preparatory interval x days) was conducted for each dependent variable. Significant main effects were found for intelligence, catch-trials and preparatory intervals for RT and RpT. Reaction time also manifested a significant main effect for days; MT yielded only a significant main effect for intelligence. Post hoc analyses indicated that catch-trial use resulted in slower RT and RpT for all levels of intelligence. In like fashion, a preparatory interval of 1.5 seconds elicited the slowest RTs and RpTs. For all dependent variables a hierarchy of performance was found; non-retarded subjects exhibited the faster times and MoR persons the slowest times. As might be expected RT was slowest on day one and fastest on day four of testing. Catch-trials had no effect upon MT. In conclusion, catch-trial use had an adverse effect upon RT and RpT performance of mentally retarded subjects and their non-retarded peers. For all three levels of intelligence uncertainty of time affected only RT and RpT.

Paul R. Surburg
Department of Physical Education
Indiana University
Bloomington, IN 47405

Sunday, April 13
10:15-11:45 a.m.

SELECTED PARAMETERS OF RESPONSE ORGANIZATION IN MILDLY MENTALLY RETARDED CHILDREN.

David L. Porretta, East Carolina University, Greenville, NC

The purpose of this study was to investigate the effect of response organization in mildly mentally retarded (MMR) children. Two groups of 30 subjects each were formed: an MMR group (mean, 8.95 years) and a chronological age (CA) matched normal group (mean, 8.63 years). An equal number of right-handed males and females were randomly assigned to one of three pre-cued conditions in which they were told that the forthcoming response would: 1) be performed with the right or left hand (pre-cue hand); 2) be to the right or left side (pre-cue direction), or; 3) cross or not cross the midline of the body (pre-cue midline). All subjects performed 30 trials which consisted of 14 ipsilateral and 16 contralateral responses. An equal number of trials were performed with each hand (dominant and non-dominant). Cues requiring ipsilateral/contralateral and dominant/non-dominant/ responses were randomly distributed throughout trials but were identical for each condition. Following instructions subjects placed their hands on microswitches 30 cm apart. A switch with a button (3 cm in diameter) was placed 17 cm to the outside of each microswitch. A ready signal consisted of an amber light which was followed by a random foreperiod (2, 3, or 4 seconds). Located above each microswitch was a stimulus light which when illuminated indicated to the subject which hand to use (pre-cue midline or pre-cue direction) or which button to strike (pre-cue hand). The task was to move the appropriate hand and strike one of the buttons as quickly as possible. Mean reaction time (RT) and movement time (MT) were analyzed separately in a 2 (group: MMR; CA-matched normal) x 3 (condition: hand; direction; midline) x 4 (response: non-dominant/ipsilateral; non-dominant/contralateral; dominant/ ipsilateral; dominant/contralateral) ANOVA with repeated measures on the last factor. Results showed that the MMR group performed significantly slower than the CA-matched normal group on RT ($p < .01$) and MT ($p < .01$) measures. All subjects exhibited significantly faster RT ($p < .01$) for the pre-cue hand condition and MT ($p < .01$) for both the pre-cue hand and pre-cue direction conditions. In general, subjects exhibited significantly faster RT ($p < .01$) and MT ($p < .01$) responses demanding ipsilateral movements regardless of whether the dominant or non-dominant limb was used. Results indicate that MMR children can react and move faster when provided with information as to which hand to use as opposed to other pre-cued information. Findings are in agreement with a previous study (Brunt, Housner & McElroy, 1983) with normal 10 year old children.

David L. Porretta
Department of Physical Education
East Carolina University
Greenville, NC 27834

Sunday, April 13
10:15-11:45 a.m.

COGNITIVE REACTIONS OF ATHLETES WITH CEREBRAL PALSY TO SUCCESS AND FAILURE IN SPORTS COMPETITION.

Gail M. Dummer, Martha E. Ewing, Rochelle V. Habeck, Sara R. Overton, Michigan State University.

Increased participation is a primary goal of many sport organizations for disabled persons. If this goal is to be realized, it is important to understand why individuals become involved in and persist in sport. Numerous investigators have demonstrated that attributions of non-handicapped performers to success and failure (objective outcome) affect subsequent participation and performance in sport. Another important cognitive factor in determining attributions is the manner in which individuals define personal success and failure in sport (subjective outcome). Subjective outcome was considered to be an extremely important cognitive factor for athletes whose ability may be related to severity of handicapping condition. The purpose of this research was to determine attributions given by athletes from the 1985 National Cerebral Palsy Games in reaction to objectively and subjectively defined success or failure in competition. A volunteer sample of 118 athletes completed questionnaires before and after an event. Pre-event questions concerned expected levels of performance, perceived athletic ability, and confidence in ability. Post-event questions concerned attributions associated with performance outcomes, performance satisfaction, and future expectations of performance in similar competitive events. Attributions (effort, ability, task difficulty, luck) were the dependent variables in an 8 (competition classification) X 2 (win or loss) MANOVA. Winning was operationally defined as a 1st, 2nd, or 3rd place finish. Attributions were also analyzed in an 8 (competition classification) X 4 (satisfied or unsatisfied winner or loser) MANOVA designed to determine the influence of *perceived* success or failure upon causal explanations of performance. Post hoc discriminant analyses were used subsequent to both MANOVA procedures to determine which attributions discriminated among subject groups. The results of these analyses indicated that athletes with cerebral palsy react to success and failure in sports in much the same manner as do non-handicapped athletes. These results also helped to explain why persons with cerebral palsy persist in sport.

Gail M. Dummer
Michigan State University
132 Intramural Sports Circle
East Lansing, MI 48824

Sunday, April 13
10:15-11:45 a.m.

MAXIMAL OXYGEN UPTAKE OF MENTALLY RETARDED ADULTS: A STUDY OF FEASIBILITY.

Bo Fernhall, Garth Tymeson, and Edyth Donaldson, Northern Illinois University.

There is a striking lack of data regarding the cardiovascular fitness of mentally retarded adults, and the data available have been collected through field or submaximal laboratory tests. Therefore, the purpose of this study was to develop a testing protocol that would allow for valid $\dot{V}O_2$ max testing of mentally retarded adults in the laboratory. 21 subjects were recruited from vocational training programs and 17 were successfully tested (8 males and 9 females). Their mean (±SD) IQ = 52.58 ± 16.3, wt = 149.76 ± 35.3 lbs, ht = 64.4 ± 4.2 in, and age = 29.29 ± 6.6 yrs. The testing was divided into 3 phases: 1) familiarization with the laboratory surroundings; 2) training the subjects to walk on the treadmill and breathe through the respiratory collection system; 3) data collection via graded exercise testing. The treadmill protocol consisted of walking at 3 mph, 0% grade for 2 min, followed by 3 mph, 2.5% grade for 2 min. From this point the speed was held constant at 3 mph, and the grade was increased 2.5% every min until exhaustion. Metabolic data were collected every min by a Beckman MCC cart, connected to the subjects through a Hans-Rudolph valve. Heart rates were collected using a Quinton electrocardiograph. The mean (±SD) maximal cardiorespiratory data were as follows: $\dot{V}O_2$ max = 26.3 ± 8.0 ml·kg^{-1}·min^{-1}. HR max = 171 ± 14 beats·min^{-1}, $\dot{V}_E$ max = 62.8 ± 21.8 L·min^{-1}, and R = 1.09 ± .07. The R values obtained are within an acceptable range for valid maximal data. In addition, 12 subjects produced supermaximal work and showed a decline in $\dot{V}O_2$ during the last min of exercise. Thus, valid $\dot{V}O_2$ max data can be obtained in this population utilizing these recommendations: 1) familiarization with the laboratory; 2) ample training time; 3) provide safety features to ensure subjects do not fall or fear falling; 4) individualize the testing protocol to the population; 5) provide an environment in which the subjects feel they are contributing members. The data show that these subjects exhibit extremely low cardiorespiratory fitness for their age, compared with nondisabled individuals. This is an agreement with previous studies utilizing field or submaximal tests indicating that young mentally retarded adults are substantially deconditioned.

This study was supported in part by a research grant funded by the Illinois Association for Health, Physical Education and Recreation.

Bo Fernhall
Department of Physical Education
Northern Illinois University
DeKalb, IL 60115

Sunday, April 13
10:15-11:45 a.m.

EFFECTS OF A WATER EXERCISE PROGRAM UPON THE FITNESS OF OLDER INDIVIDUALS.

Phyllis T. Croisant, Eastern Illinois University.

Water exercise has been touted as strenuous enough to improve fitness, while accessible to populations unable to exercise on land. The buoyancy of water, along with its resistive and cushioning qualities, makes it an excellent exercise medium for individuals who are arthritic, inflexible, overweight, weak, or risk injuries from falls. However, research documenting the potential physiological benefits of water exercise is extremely limited. The purpose of this study, therefore, was to determine the effects of a program of progressive water exercises upon the cardiovascular fitness, muscular strength, flexibility, and body composition of inactive individuals age fifty or older. Thirteen subjects (10 female, 3 male) age 61.1 ± 6.5 years participated in the program. After screening for disqualifying medical conditions and giving informed consent, the subjects underwent the following battery of tests: 1) a graded exercise test including EKG and VO_2 measures, 2) anthropometric and skinfold measures, 3) strength and flexibility testing. They then participated in ten weeks (3x/week) of water exercise with emphasis upon aerobic conditioning (60-70% of heart rate reserve), flexibility, and upper body strength exercises. Gains in cardiovascular endurance were demonstrated by a mean increase of 2.1 minutes in exercise time to volitional maximum, and an increase of 100 kpm/min in peak workload on the graded exercise test. Peak VO_2 increased from 18.4 to 20.7 ml/kg/min, while heart rates at standard submaximal workloads decreased approximately 3 bpm from pre to posttest. Nine of the thirteen subjects showed a weight loss over the ten weeks (mean -1.9 kg). Average changes in girth for all thirteen subjects ranged from -1.1 cm at the waist to -1.6 cm at the hip. All subjects demonstrated gains in flexibility with a mean increase of 4.1 cm on a sit-and-reach test. Changes in strength were not significant. In summary, a program of water exercises was effective in increasing maximum work capacity and cardiovascular efficiency, in increasing flexibility, and in decreasing body weight and girths in a group of inactive seniors. Water exercise appears to be both effective and enjoyable to individuals who may not be able to participate in more traditional fitness activities, and should be considered as an alternate mode of exercise.

Phyllis T. Croisant
Department of Physical Education
Eastern Illinois University
Charleston, IL 61920

Sunday, April 13
10:15-11:45 a.m.

MOVEMENT PURPOSE VALUES AMONG WHEELCHAIR ATHLETES Diana B. Richardson, University of Maryland.

The purpose of this study was to identify the strength of movement purpose values among wheelchair athletes. The PPMMI-83 (Robinson, et al., 1983) which utilizes 22 movement purpose items and an additional 9 movement purposes which were specific to wheelchair athletes were employed. Subjects included 82 wheelchair athletes representing regional, national and international level competitors. One-way ANOVA's were performed analyzing total scores by variables (age, sex, competitive classification, disability, etc.). Results indicated that the longer individuals were disabled the less meaning movement had for them ($p<.05$). One-way ANOVA's done by analyzing each movement purpose by variable showed increased movement valuing by persons more recently disabled on 9 items. Persons disabled as adults used movement as a means of preventing complications from disability more so than persons disabled as children ($p<.01$). Women valued catharsis ($p<.05$) and self-expression ($p<.01$) more than males and persons who competed at national and international levels valued movement items associated with attractiveness, competition, physical improvements and enjoyment higher than regional competitors. Differences by type of disability were on expression of feelings ($p<.05$ only. These findings have implications for curriculum development and program planning.

Diana B. Richardson, Ph.D.
Department of Recreation
University of Maryland
College Park, MD 20742

Sunday, April 13
10:15-11:45 a.m.

ATTITUDES OF HIGH SCHOOL PHYSICAL EDUCATORS TOWARD TEACHING HANDICAPPED STUDENTS.

Terry L. Rizzo, State University of New York, College at Cortland; Rollin G. Wright, University of Illinois.

Past research using the Physical Educators Attitudes Toward Teaching the Handicapped (PEATH) inventory indicates that attitudes of elementary school physical educators are more favorable toward teaching students with learning handicaps than physical handicaps, and as grade level advances attitudes of physical educators become less favorable about teaching such students (Rizzo, 1984). The purpose of the present study was to extend previous research by surveying attitudes of high school physical educators toward teaching handicapped students in physical education classes. The PEATH inventory was sent to 200 high school physical educators and 136 (68%) provided interpretable responses. The data were collected during the Spring Semester 1985 from teachers in a midwestern city. The main objectives of this study were to determine the degree to which attitudes of high school physical educators are influenced by grade level (9 & 10, 11 & 12) and the specific handicaps (physical and learning) of students. Reliability (coefficient alpha) of the PEATH inventory was .98 for this group of teachers. A 2 (grade level) by 2 (handicapped condition) randomized block factorial design demonstrated a F value for the main effect of handicapped condition $F\ (1,135) = 13.83$, $p < .001$; and grade level, $F\ (1,135) = 2.13$, $p > .14$. There was no interaction between handicapping condition and grade level, $F\ (1,135) = 3.06$, $p > .08$. Data showed that high school physical educators held unfavorable attitudes toward teaching students with either learning or physical handicaps at any grade level. However, physical educators' attitudes toward teaching students with learning handicaps were more favorable than toward teaching physically handicapped students. Teachers may perceive students with learning handicaps as more closely resembling their nonhandicapped peers in terms of physical ability, thereby explaining their preference of students with learning handicaps over those with physical handicaps. Perhaps teachers perceive the regular class as placing too many demands on students with physical handicaps. Unless the attitudes of physical educators change and become more favorable toward teaching students with handicaps, the opportunity for successful assimilation into regular classes are minimal at best.

Terry L. Rizzo
Department of Physical Education
E 308 Park Center
SUNY College at Courtland
Courtland, NY 13045

Sunday, April 13
10:15-11:45 a.m.

THE ATTITUDE OF NORMAL, MENTALLY IMPAIRED AND GIFTED CHILDREN TOWARD PLAY. By C. Eric Gronbech and Bruce Hopkins, Chicago State University.

This study was designed to investigate attitude toward play of special children. These students are ones who function outside the range of normality either intellectually, behaviorally or physically. A great deal of attention has been focused on the mentally impaired, the socially emotionally maladjusted, and the physically handicapped and physically elete (athletes). The intellectually gifted however have been virtually ignored. In fact some educators have labeled them the most neglected segment of the student population. Paradoxically, it is the gifted who may have the potential to make the greatest contribution to our future.

If athletic experience influences the physical, social, mental and emotional domains of students and if those experiences carry over into life, each and every student can benefit from competitive athletic experiences. Our capitalistic free enterprise system is founded on competition. The normalization of this experience is important for the mentally impaired and the mentally gifted, yet both are often times cloistered. The impaired are treated specially by others whereas the gifted often times are influenced to choose special intellectual pursuits in lieu of physical ones. Previously published literature regarding the relationship between physical and intellectual function is at best inconclusive with problem, method and discussion of results all questionable.

One hundred seventy three normal, 74 mentally impaired and 137 gifted children, both male and female, age 10-16 years served as subjects. They were administered Webb's Professionalization of Attitude Towards Play Scale inclusive of the alternative fun. This scale was deemed appropriate due to the divergent intellectual functioning of the population and selected cognizant of its questionable validity. The rankings for skill and victory were summed to yield the professionalization score. Computation of a 2X3 ANOVA resulted in the findings that males were more professionalized in attitude than females, and normals were more professional than the mentally impaired or gifted. No difference between the special groups existed. These results should direct physical educators to emphasize the importance of competition to all our students; to prepare the mentally impaired to function in our competitive society and prepare the gifted to compete equally for their rightful place in it.

C. Eric Gronbech
Department of Physical Education
Chicago State University
95th Street at King Drive
Chicago, Illinois 60628

Sunday, April 13
10:15-11:45 a.m.

Inter-rater Reliability of the Abstract Review Process

Larry D. Hensley, University of Northern Iowa

With the increased demand for evidence of scholarly productivity in higher education during the last decade, there has been a proliferation of materials submitted for publication or presentation. The increased number of manuscripts and abstracts submitted for consideration makes the review process more critical. The purpose of this study was to determine the inter-rater reliability, or objectivity, of the reviewers ratings of abstracts submitted for presentation at the Research Section meetings during the 1985 Central District AAHPERD Convention. Each of 25 abstracts submitted to the Chairperson of the Research Section were reviewed and evaluated by 3 persons, the current chair, chair-elect, and past-chair of the Research Section of CDAAHPERD. The reviewers were asked to evaluate all abstracts, regardless of the subject or their own area of expertise. Each reviewer was provided with a standard abstract evaluation form utilized by the Research Consortium of AAHPERD and accompanying instructions. The instructions were minimal, but were consistent with those provided to the reviewers for the National AAHPERD Convention. Each abstract was evaluated in 5 areas (significance of topic, purpose, methodology, results, and conclusions) on a 0-5 point scale and was given an overall rating based upon the sum of these sub-area scores. All reviews were blind. The average abstract rating ranged from a low of 12.0 for one reviewer to a high of 16.0 for another. However, the relative rankings of the abstracts were quite similar across all reviewers. Inter-rater reliability on the overall abstract rating was found to be .81 using intraclass correlation techniques. Furthermore, analyses of the reviewers ratings of each of the sub-areas resulted in coefficients ranging from .67 for methodology to .82 for significance of topic. It was concluded that, in general, the inter-rater reliability was marginally acceptable for the abstract review process described. It is suggested that by utilizing reviewers only in their area of expertise, inter-rater reliability would likely improve.

Larry D. Hensley
School of HPER
University of Northern Iowa
Cedar Falls, IA 50614

Sunday, April 13
12:15-1:45 p.m.

TEST OF A MODEL SCORING SYSTEM FOR THE SELF-REGULATION OF INTERNATIONAL BIAS IN GYMNASTICS JUDGING.

Charles J. Ansorge and John K. Scheer, University of Nebraska-Lincoln.

In recent years international bias in the officiating of gymnastics competition has been clearly documented. Ansorge and Scheer (1985) found that judges in the 1984 Olympics were biased both for gymnasts from their own countries and against countries in close competition. The purpose of this study was to test a model for the self-regulation of judging bias which has been proposed to the International Gymnastics Federation. The model has two implementation phases: (1) subtraction of a pattern bias score from the team total for judges who are high on their own countries, and (2) addition of a bias score to the team total when judges underscore teams immediately preceding or following their own. For both the subtraction and addition methods, a judge's high and low deviations from the average scores on a team are eliminated from consideration, and the four middle deviations are totaled. This total deviation is subtracted or added if it reveals bias in the expected direction. Analysis of this system, using the men's competition at the 1984 Olympics, revealed that all judges favored gymnasts from their own countries, and most underscored gymnasts from close countries as well. If only the first phase of the system had been used, China would have won the team championship instead of the United States, with all other teams finishing in the same order. However, when both phases of the model were implemented, the United States again finished first, and all other teams finished in the same original order. In other words, the United States judges showed greater favoritism for their own team than did the Chinese, but the Chinese showed greater negative bias against the United States than did the USA judges against the Chinese. To avoid a simple shift from a positive to a negative bias pattern, the writers recommended that both phases of the model be implemented at the same time.

Charles J. Ansorge
126 Mabel Lee Hall
University of Nebraska-Lincoln
Lincoln, NE 68588

Sunday, April 13
12:15-1:45 p.m.

RELIABILITY ESTIMATION FOR TRIALS-TO-CRITERION TESTS USING THE SPLIT HALVES ESTIMATOR. Bethany S. Shifflett, San Diego State University

Most physical educators meet with their students for a limited amount of time per week. Therefore, it is desirable to develop tests that will accurately measure student performance in a minimal amount of time. A method of assessment which can reduce the time spent administering a skills test, when compared to traditional methods, is sequential testing. A sequential testing method currently under investigation for use by physical educators is the trials-to-criterion test. With trials-to-criterion testing, test length is variable for examinees. This makes estimation of the reliability for these tests an interesting area of study. Previous work with estimating the reliability of trials-to-criterion tests has shown the parallel forms estimator to be the least biased; however, a drawback is that the test needs to be given twice. The estimator recommended when a single administration of a trials-to-criterion test is given is the unbiased error variance (UEV) estimator. This study was undertaken to compare another single administration technique, namely split halves, with the parallel forms and UEV estimators. the information collected indicated 1) the effect of sample size on these estimators, 2) the effect of the shape of the distribution of ability, 3) the effect of the size of the criterion score, 4) the degree of bias, and 5) the variability of these estimators. All three estimators were similarly affected by sample size, shape of the distribution, and size of the criterion score. The UEV estimator was the least variable of the three estimators studied. The parallel forms estimator remained the least biased, and the split halves estimator was less biased than UEV.

Bethany Shifflett
San Diego State University
Physical Education Department, WG362
San Diego, California 92182

Sunday, April 13
12:15-1:45 p.m.

A COMPUTER BASED SYSTEM FOR THE MEASUREMENT OF SWIM POWER DURING FRONT CRAWL SWIMMING.

John P. Kirwan, Ball State University; David L. Costill, Ball State University; Fredrick R. Rayfield; Robert A. Thomas, Ball State University.

Measurement of swimming power and force are considered good indicators of sprint swimming performance. Power and force during tethered swimming were measured on a specially adapted "biokinetic" swim bench. The system was designed so that the force generated during the swim was measured by a force transducer in the "biokinetic" apparatus. The voltage generated was relayed to an 8-bit A-D converter and Apple II+ computer. The computer provided a graphic print-out of the force generated during each stroke and a tabulated print-out of the swimmer's force, work, power and power/kg lean body mass during the swim. To establish the validity of the system, 76 collegiate swimmers (46 male and 30 female) performed a tethered front crawl swim, 25 yard front crawl sprint, and a "biokinetic" dry-land swim test. The male swimmers generated maximal power at a speed setting of 0.93 m/sec while female swimmers achieved maximal swim power at 0.62 m/sec. Swimming power during the tethered swim was found to correlate 0.84 ($p < 0.05$) with the swimmers' maximal sprint swim. A correlation of 0.24 was found between power during the tethered swim and the dry-land "biokinetic" strength test. This testing system provides a rapid and sensitive means of determining swim power during front crawl swimming. These data suggest that tethered swim power accurately predicts sprint swimming performance during the front crawl stroke.

John P. Kirwan
Human Performance Laboratory
Ball State University
Muncie, IN 47306

Sunday, April 13
12:15-1:45 p.m.

DEVELOPMENT OF A MOTOR CREATIVITY RATING SCALE. Claudine Sherrill and Georgia Bonatis, Texas Woman's University.

The TWU Motor Creativity Rating Scale (MCRS) was designed to measure motor creativity in free play, movement education, and dance improvisation. The intent of this paper is to present the findings of several pilot studies conducted to examine the validity, reliability, and objectivity of the MCRS. This Likert-type rating scale is comprised of 19 questions categorized under the subheadings of originality, fluency, flexibility, and elaboration. A total score (40 points) can be derived or separate scores for each of the four recognized components of motor creativity. The MCRS has been studied primarily as a measure of children's movement responses to novel play apparatus in a free play setting. Each child is videotaped individually in 5-min segments, and several raters score creativity. Among the samples studied are sixty 3-year-olds on the Lind Climber and twenty 3- and 4-year-olds on the London Trestle Tree Apparatus. Test-retest reliability ranges from .82 to .97. Criterion-related validity with both teachers' ratings and the Torrance Test of Thinking Creatively in Action and Movement has been examined as well as content and construct validity. The MCRS appears to be a valid and reliable measure of motor creativity in several settings with several age groups.

Claudine Sherrill
Physical Education Dept.
Texas Woman's University
Denton, TX 76204

Sunday, April 13
12:15-1:45 p.m.

AN OBJECTIVE METHOD FOR MEASUREMENT OF MUSCULO-SKELETAL SIZE IN CHILDREN AND YOUTH.

Mary H. Slaughter, University of Illinois; Timothy G. Lohman, University of Arizona; Richard A. Boileau, University of Illinois; Constance B. Christ, University of Illinois. Physical Fitness Research Laboratory.

The purpose of this paper is to present an objective method for estimating the musculo-skeletal size in relation to height for use in the study of body physique in athletic and non-athletic children and youth, and to establish a rationale for the development of the new approach. The method can be applied to various male and female groups and indicates the relative musculo-skeletal size by the extent to which each group falls above or below the regression of fat-free body (FFB) on height as derived from the non-athletic male and female populations. Measures of body density (D) (hydrostatic weighing), bone mineral (M) (photon absorption), and total body water (W) (D_2O dilution), were taken on 262 black and white males and females (ages 8-18 years). Percent fat was calculated by a multicomponent equation: $\%fat = ((2.747/D) - .727(W) + 1.146(M) - 2.0503)100$. FFB was calculated by subtracting the product of the body weight and the percent fat from the body weight. The equations which best predicted FFB from a height exponent within sex and race were as follows:

Black males $\hat{Y} = .0000113(ht^3) - 2.2$; SEE = 5.0
White males $\hat{Y} = .0000106(ht^3) - 1.6$; SEE = 5.4
Black females $\hat{Y} = .0000096(ht^3) - 2.0$; SEE = 4.5
White females $\hat{Y} = .0000086(ht^3) + 4.0$; SEE = 3.6

Significant differences (.05) were observed between the black and white male regression lines, but differences were not found between the black and white female lines. The relative musculo-skeletal size of the non-athletic samples from the literature, when their FFB was corrected for maturation level, did not differ significantly (.05) from our criterion sample, with both male and female groups falling within 1 SEE of their respective regression lines. This method of estimating relative musculo-skeletal size in children and youth establishes a frame of reference for quantifying the non-athletic population, and now permits the comparison of the physique of the athletic youth with their non-athletic counterparts.

Supported by NIH Grant AM 26351

Mary H. Slaughter
Physical Fitness Research Laboratory
906 S. Goodwin Ave.
University of Illinois
Urbana, IL 61801

Sunday, April 13
12:15-1:45 p.m.

THE RELIABILITY OF THE RLV-WASHOUT AND FRC-WASHOUT TECHNIQUES FOR MEASURING RESIDUAL LUNG VOLUME.

James E. Graves, Ph.D., Michael L. Pollock, Ph.D. and Scott J. Montain, MS, Universal Services Rehabilitation and Development, Inc.

Five males and 7 females were studied to determine the reliability of 2 methods of measuring residual lung volume (RLV). One method (RLV-Wash) involved measuring RLV directly using the N_2 washout technique. The second method (FRC-Wash) involved calculating RLV by measuring functional residual capacity (FRC) using the N_2 washout technique and subtracting expiratory reserve volume (ERV). Each method was performed in duplicate trials on 2 separate days by each of 2 investigators. Measurements were balanced over investigators and days. Analysis of variance (ANOVA) with repeated measures was used to determine differences between investigators, days, methods and trials. A probability of $P \leq .05$ was required for statistical significance. The reliability of each method was determined using Cornbach's standardized item alpha (α). No significant differences ($P > .05$) were noted between investigators, days, methods and trials (see table for means ± SD; all values are liters, BTPS; I = Investigator; D = Day; T = Trial).

	MEAN	± SD		MEAN	± SD
I1	1.283	0.241	RLV	1.304	0.193
I2	1.304	0.206	FRC	1.283	0.252
D1	1.281	0.255	T1	1.310	0.240
D2	1.306	0.199	T2	1.276	0.201

Cornbach's α's for the RLV-Washout and FRC-Washout procedures were 0.956 ($P < .05$) and 0.893 ($P < .05$), respectively. These data indicate that both methods of determining RLV are highly reliable. When using RLV in body composition analysis by the hydrostatic weighing technique, there is no advantage to measuring RLV from an end tidal volume versus a true residual volume.

James E. Graves, Ph.D.
Universal Services Rehabilitation and
Development, Inc.
6655 Travis, Suite 500
Houston, TX 77030

Sunday, April 13
12:15-1:45

PROBLEMS IN ESTIMATING RESIDUAL VOLUME OF MALE ATHLETES FOR BODY DENSITOMETRY. Anthony C. Hackney, Wayne E. Sinning and Kathleen D. Little, Kent State University, Kent, OH 44242.

The purposes were to evaluate existing equations (EQ) for estimating residual volume (RV) for body densitometry (BD) in male athletes and develop a more accurate EQ. Circumferences (C), diameters, skinfolds (S), BD and RV (N_2 washout method) were obtained on 265 subjects. Six existing EQs were evaluated: EQ1- Goldman & Becklake, Am Rev Tuber 79:1959; EQ2- Needham et al. Thorax 9: 1954; EQ3- Permuit & Martin J Appl Physiol 15: 1960; EQ4- Turner et al. J Appl Physiol 25: 1968; EQ5- Boren et al. Am J Med 41: 1966; EQ6- Grimby & Sodenhalen Acta Med Scand 173:1963. Validity was evaluated on the basis of mean differences (t-ratio), correlation between estimated and measured RV [E-RV & M-RV ($\bar{X}$±SD,1.536±.343 ℓ)], and total error (TE). Results (*p $\leq$.05) were:

EQ#	E-RV	t-ratio	r	SEE	TE
1	1.714±.209	9.7*	.514*	.295	.345
2	1.685±.026	7.0*	.066	.343	.374
3	0.900±.116	34.1*	.514*	.295	.703
4	1.439±.348	4.6*	.514*	.295	.354
5	1.436±.149	5.5*	.514*	.295	.311
6	1.424±.147	5.7*	.394*	.316	.335

To generate the new estimation EQ, zero-order correlation and factor analysis (FA) were used to select measures with minimum shared variance. The FA showed high loadings with underwater weighing and anthropometric variables. Stepwise regression analysis (N=180) produced the following EQ: RV(ℓ) =0.028(Ht) + 0.019(shoulderC) - 0.250(underwater wt) - 0.012(Σ3S) - 4.259;(R = .627, SEE =.267). Validity was evaluated on the remaining 85 subjects. Results were:

M-RV▲	E-RV▲	t-ratio	r	SEE	TE
1.599±.344	1.630±.214	1.2	.695*	.249	.249

E-RVs from existing EQs were significantly different from M-RV. While correlations revealed significant relationships for 5 of the EQs, large SEEs and TEs suggest excessive estimation error. Percent body fats (%fat) computed with the E-RVs instead of M-RV were significantly different from true %fat. E-RV▲ by the new EQ did not differ significantly from the validity sample's M-RV▲; also, a larger r and a smaller SEE and TE were found. No significant difference was found between the %fat computed with E-RV▲ or M-RV▲. The generated EQ is more accurate for the estimation of RV for use in BD in male athletes than are the existing EQs.

Anthony C. Hackney
Applied Physiology Research Laboratory
School of PERD
Kent State University
Kent, OH 44242

Sunday, April 13
12:15-1:45 p.m.

VALIDATION OF SECOND COMPONENT OF HEATH-CARTER'S SOMATOTYPE METHOD IN CHILDREN AND YOUTH 8 TO 18 YEARS.

B. Elmore, T.G. Lohman, M.H. Slaughter, R.A. Boileau. Physical Fitness Research Laboratory, University of Illinois at Urbana-Champaign.

Tables for Heath-Carter anthropometric somatotype method were developed largely from adult data, but applying extended scales to children combined with added difficulty in rating due to smaller size, fat compressibility and a more cartilagenous skeleton raises serious question in the validity of this technique as applied to young people. The purpose of this study was to investigate the validity of Heath-Carter's second component in prepubescent, pubescent and postpubescent children. Heath and Carter define second component as fat-free body (FFB) mass relative to height. A total of 76 male and 58 female subjects were assessed for maturational levels by examination of secondary sexual characteristics and fit into the following groups: males - 31 prepubescent, 11 pubescent and 34 postpubescent; females - 12 prepubescent, 17 pubescent, and 29 postpubescent. The Heath-Carter anthropometric method of measuring somatotype was employed. Fat-free body mass was estimated from the combination of body density (Db), total body water (W) and bone mineral content (B) of the forearm ($\text{Fat} = 1.2069/0.4393\ \text{Db} + 0.727\ W + 1.146\ B - 2.0503$). Regression lines for height on FFB mass were estimated for each sex with the deviation score (actual FFB minus predicted FFB) for each subject, hence for each maturation group, used as the criterion for second component. Prepubescent males have a deviation score almost 7 kg below that of postpubescent males, yet the difference between second component rating for these stages was small (0.2). Postpubescent and pubescent females have lower deviation scores than postpubescent females, yet second component for these less mature stages was larger than for postpubescent females. This inconsistency exists even though second component correlated moderately well with deviation score (.59 to .79) for each maturational group. Regression lines (second component on deviation score) for both postpubescent males and females lie above and parallel to the regression lines for their respective younger stages. This result indicates when all stages of either sex receive the same second component rating, postpubescent subjects are given a larger FFB mass relative to height rating. Since Heath and Carter base their somatotype system on data from adults, the Heath-Carter anthropometric method overestimates FFB mass relative to height in prepubescent and pubescent boys and girls.

Bruce Elmore
Physical Fitness Research Laboratory
906 S. Goodwin Ave.
Urbana, IL 61801

Sunday, April 13
12:15-1:45 p.m.

EFFECT OF MUSCULOSKELETAL DEVELOPMENT ON PREDICTION OF BODY DENSITY.

Susan Vickery, East Carolina University; Mitchell Collins, University of Georgia; Kirk Cureton, University of Georgia.

The effect of musculoskeletal development on the prediction of body density was determined in a group of 319 males, aged 18 to 30 years, who varied widely in musculoskeletal development. Subjects were divided into three groups based on their Heath Carter Somatotype mesomorphy rating. Mesomorphy Group 1 consisted of subjects who scored more than 0.5 SD below the mean mesomorphy rating. Mesomorphy Group 2 consisted of subjects scoring less than ± 0.5 SD from the mean mesomorphy rating, and Mesomorphy Group 3 consisted of subjects scoring more than 0.5 SD above the mean mesomorphy rating. Musculoskeletal development (defined by mesomorphy rating) was entered into regression models predicting body density from the sum of three (chest, abdomen and thigh) or seven (chest, midaxillary, tricep, subscapula, abdomen, suprailiac and thigh) skinfolds, the sum of skinfolds squared and age . Mesomorphy rating accounted for a significant ($p <.05$) proportion of body-density variance beyond the other independent variables in both the equation using the sume of seven skinfolds and the equation using the sum of three skinfolds. The significant differences in residual scores (measured minus predicted body density) between Mesomorphy Groups 1 and 3 and between Mesomorphy Groups 1 and 2 were eliminated after mesomorphy rating was entered into the regression model as an independent variable. There was no significant difference in residual scores between Mesomorphy Groups 2 and 3 either before or after mesomorphy rating was entered as an independent variable. The addition of mesomorphy rating as an independent variable also eliminated the significant mean differences between measured and predicted body densities found within Mesomorphy Groups 1 and 3. A single or the sum of two circumference measures eliminated significant differences in body density prediction between the mesomorphy groups when substituted for mesomorphy rating as an independent variable in the regression model. The results indicate that musculoskeletal development significantly affects the accuracy of predicting body density from skinfolds and age. If this effect is due to variation in the composition of the fat-free body, the data suggest a need to modify the equation used to convert body density into fatness based on degree of musculoskeletal development.

Susan Vickery
Department of HPER
East Carolina University
Greenville, NC 27834

Sunday, April 13
12:15-1:45 p.m.

WEIGHT LOSS AND LEAN BODY MASS MAINTENANCE IN OBESE ADOLESCENTS.

M.D. Becque, K. Hattori, V. Katch, A. Rocchini, C. Marks and D. Ballor, University of Michigan

To determine the effects of weight loss (wt-loss) on the maintenance of lean body weight (LBW) in obese adolescents, we studied 35 obese children. Twenty-two subjects (10 male, 12 female) who lost weight and 13 control subjects (6 male, 7 female) were studied for height, weight, 5 skinfolds, 19 girths, 9 diameters and body composition by hydrostatic weighing prior to and after either a control or a 20 week experimental period. The wt-loss program included either diet therapy and behavior modification (Diet) or diet therapy, behavior modification and exercise (Exercise). No significant differences were found for the total or composition of wt-loss between the Diet and Exercise groups, therefore the groups were combined. No significant pre-treatment differences were found between the groups. Pre- to post-test changes expressed as a ratio (Post-test / Pre-test * 100) are presented below (Mean ± SEM).

Pre-to Post-test ratios*

	Weight-loss		Control	
	Male	Female	Male	Female
Height	102.1±0.30	101.6±0.43	101.5±0.25	101.3±0.30
Weight	97.4±1.09	95.7±1.52	104.9±1.44†	104.7±1.08†
Fat Weight.	91.2±4.58	89.1±3.58	103.3±2.96	108.2±3.46†
LBW	101.5±1.52	100.9±2.14	105.4±2.05	103.0±1.38
Triceps Skf.	87.8±5.38	85.9±4.91	112.5±3.78†	93.9±5.76
Elbow Dia.	101.0±1.31	100.4±2.38	102.0±2.98	101.3±1.80

* 100.0 = no change; † p<0.01, Weight-loss vs. Control

Both males and females lost weight (1.7 and 3.2 kg, respectively), while control subjects gained weight. It is striking that wt-loss did not reduce linear growth, LBW or skeletal diameters. Thus, it appears that with modest wt-loss maintenance of LBW is possible with a concomitant loss of fat weight and subcutaneous fat in obese adolescents although individual variability in the composition of wt-loss was observed.

M. Daniel Becque
Department of Kinesiology
University of Michigan
Ann Arbor. MI 48109-2214

Sunday, April 13
12:15-1:45 p.m.

SOMATOTYPE AND BODY COMPOSITION OF 50-70 YEAR OLD FEMALES. Barry C. McKeown, The University of Texas at Arlington; Joyce E. Ballard, The University of Texas at Tyler.

While the morphological characteristics of young adult females have received attention in the research literature, very little information is available to characterize those physical measurements of adult females in the sixth and seventh decades of their lives. In this study, the morphological variables, including somatotypes, physical dimensions and body composition, were assessed in 50-70 year old females ($N = 92$). Parameters measured included height, weight, body density, percent fat, six skinfolds, seven circumferences, and seven diameters. Skinfold and diameter were measured with Harpendon instrumentation. Body density was evaluated by hydrostatic weighing with residual volume estimated from the formula of Sinclair et.al. (New Zealand Journal of Medicine 91:1-5, 1980) using height, weight, and age as predictors. Mean values for the composite group were as follows: age = 58.5 ± 5.8 yrs; ht = 162.0 ± 5.2 cm; wt = 61.6 ± 9.5 kg; BD = 1.0267 ± 0.0158 gm/cc; BF = 31.0 ± 6.8%; FW = 19.4 ± 6.9 kg and FFW = 41.7 ± 4.8 kg. Consequently, these females were shorter, heavier, possessed more fat weight and a greater percent body fat, yet with approximately the same fat-free weight as the 20-24 year old "reference woman" of Behnke and Wilmore (1974). The Heath-Carter somatotype values of 5.2-4.4-1.7 described the women as "meso-endomorphs". A subsequent analyses by age (50-54, 55-59, 60-64, 65-70) revealed that there were no significant differences ($p<.05$) among the groups for any of the measures of somatotype or body composition. There was a trend, however, for the endormorphic component to increase (5.1 to 5.8) and ectomorphy to decrease (1.8 to 1.2) with age. Additionally, as anticipated, total body weight and measures of body fatness (% BF and FW) increased while body density and fat-free weight decreased with age. The variable by age analysis revealed no significant differences among measures of height, skinfolds and circumference with two significant diameter differences (hip and elbow). Although the other anthropometrical differences were not significant, there were numerical trends by age in four of the remaining variables: SF (supra-iliac, abdomen, and subscapula); and waist circumference. As was expected, the values for these measures and the significantly different hip diameter, all in the central portion of the body, increased by age. Analysis of vital capacity measures revealed the value to significantly decrease with age (3,346 to 2,625 ml) while RV significantly increased (1,720 to 1,869 ml). The results of this study on 50-70 year old females indicates there are arithmetical differences of body composition and somatotype across age in addition to the numerous descrepancies exhibited with the 20-24 year old "reference woman." Consequently, due to the effects of the aging process including alterations in physique because of factors such as osteoporosis, metabolism and body fat depositions, values are presented which may be more representative of a "reference woman" in the 50-70 year old range.

Barry C. McKeown
Department of Physical Education
University of Texas-Arlington
Arlington, TX 76019

Sunday, April 13
12:15-1:45 p.m.

A COMPONENT ANALYSIS OF SIT-AND-REACH SCORES. Barry A Frishberg, South Carolina State College.

The sit-and-reach test was in AAPHERD Health-Related Physical Fitness Test to estimate a person's low-back and hamstring flexibility. This study was conducted to determine what proportion of a person's sit-and-reach score is due to flexibility measures and/or anatomical body segment lengths. While the subject was holding the extreme reaching position a 35mm slide picture was taken and appropriate body joints digitized. The first analysis divided the body into 3 segments (legs, trunk, and arms). Leg length was measured from the soles of the feet to the head of the femur, arm length was measured to the finger tips, and trunk length was measured from the head of the femur to the head of the humerus with the trunk angle being calculated with a line parallel to the ground. The average trunk angle was 49.99° ± 0.97SE. When a stepwise regression was performed to predict the sit-and-reach score, the first variable selected was the trunk angle which predicted 87% of the variance(R=0.93). The next variables entered in the following order were the leg length, arm length and trunk length with the resultant complete model explaining 98% of the variance(R=0.99). The second analysis divided the trunk into 3 sections(top 6 thoracic, bottom 6 thoracic and lumbar vertebrae) and estimated pelvic tilt and scapular abduction. The segment representing pelvic tilt rotated the most (70°) and accounted for 44% of the total flexion. The lumbar vertebrae contributed another 25% of the total flexion with the upper and lower thoracic vertebrae contributing the remaining 18% and 14%, respectively. In the new model the first variable entered by the stepwise regression was the angle for the upper thoracic vertebrae segment which explained 30% of the variance (R=0.55). Pelvic tilt was the next variable entered and the equation now explained 51% of the variance(R=0.71). The angle of the lumbar vertebrae was selected next which explained an additional 23% of the variance(R=0.85). After the angle variables were included, the next 2 variables entered into the equation represented the lengths of the legs and arms which now explained 89% of the variance(R=0.94). When the remaining variables were entered, the final model explained 96% of the variance(R=0.98). For the average person doing the sit-and-reach test, the pelvis and lumbar vertebrae provide almost 70% of the flexion with the angle of the thoracic vertebrae and the person's arm and leg lengths also making significant contributions.

Barry A. Frishberg
Health and Physical Education Dept
South Carolina State College
Orangeburg, SC 29117

Sunday, April 13
12:15-1:45 p.m.

THE RELATIONSHIP OF THE SIT AND REACH TEST TO CRITERION MEASURES OF HAMSTRING AND BACK FLEXIBILITY IN YOUNG FEMALES. Allen W. Jackson; Alice Baker, North Texas State University, Denton, Texas.

The purposes of the present investigation were to determine the relationships of the sit and reach test, a component of AAHPERD Health Related Fitness Test 1980, and criterion measures of back and hamstring flexibility. Young females (n=100) with a mean age of 14.08 years ± .825 were administered two trials of three tests in a counterbalanced order. The measurements included the sit and reach test, passive hamstring flexibility using a Leighton Flexometer, and a test of back flexibility using a protocol suggested by Macrae and Wright, 1969. Test-retest reliability estimates exceeded .90 for all measurements. Results indicated that the sit and reach test had a moderate relationship (r=.64) with passive hamstring flexibility. The correlations between the sit and reach test and total back flexibility (r=.07), upper back flexibility (r=-.16), and lower back flexibility (r=.28) were low. Cross validation samples indicated consistent correlational results. These findings indicate the sit and reach test has moderate criterion related validity when used as an assessment of hamstring flexibility but appears not to provide a valid assessment of back and, in particular, low back flexibility which is one of the reasons it was included in the Health Related Fitness Test.

Allen W. Jackson, Ed.D.
Division of Physical Education
North Texas State University
Denton, TX 76203

Sunday, April 13
12:15-1:45 p.m.

THE FUNCTION OF AGE AND GENDER UPON MEASURES OF MUSCULAR ENDURANCE

Michael E. Crowhurst and James R. Morrow, Jr., University of Houston.

Since the development of health related fitness tests, various testing batteries have been suggested (i.e., AAHPERD Health Related Test, South Carolina Physical Fitness Test, Texas Physical Fitness--Motor Ability Test). Muscular endurance is perceived by some to be a health related fitness component. The purpose of this study was to determine the function of age and gender upon upper body muscular endurance in Texas school age children aged 9-16. Three-thousand-seven hundred and sixty-seven Texas children completed two measures of upper body endurance: (1) flexed arm hang for time and (2) one-minute sit-up test. Items were completed as suggested in the AAHPERD Youth Fitness Test Manual. Analyses of variance were utilized to determine the association between gender, age and the gender by age interaction upon the measures and to define the characteristic growth patterns demonstrated by boys and girls. Results indicate that boys perform significantly better than girls on both tests ($p < .001$) and that scores generally increase with age ($p < .001$). However, there is a significant interaction between gender and age ($p < .001$) which illustrates that the age increase in strength is not constant for the genders. Flexed arm hang scores change very little for girls across all ages while the boys performance begins to increase once they reach age 13. Sit-up performance follows a similar pattern for boys and girls through age 14. However, boys' performance continues to improve and girls' performance begins to decline. Changes across age are (1) dependent upon gender, (2) very little for girls' in arm strength, and (3) begin to decrease at age 13 for girls' abdominal strength. The current results illustrate performance patterns which do not typically increase for girls. Results could have impact upon programmatic decisions in physical education classes if muscular endurance is a physical fitness objective.

Michael E. Crowhurst

Department of HPER
University of Houston
Houston, TX 77004

Sunday, April 13
12:15-1:45 p.m.